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MANITOBA Pulse Soybean GROWERS

MANITOBA CROP ALLIANCE

2020 ON-FARM RESEARCH RESULTS

DECEMBER 2020

Thank you to all participants!

Thank you for your participation in the On-Farm Network!

This growing season, with your participation and support, a total of 105 on-farm trials were completed across Manitoba through MPSG and MCA. We would like to thank each of you for your interest in conducting on-farm research and we hope to help facilitate future research trials on each of your farms.

In this book you will find important information for interpretation of single-page reports followed by summary tables and reports for each 2020 trial, arranged by trial type. The contents of this booklet are for individual trial-by-trial results only; combined and overall analyses are on-going. Keep an eye out for this at future events and in publications such as MPSG's *Pulse Beat* magazine.

Along with this booklet, additional information is available. Single-site reports from 2012 to 2020 can be found in MPSG's On-Farm Network database at manitobapulse.ca/on-farm-network/on-farm-research-reports and on MCA's website at mbcropalliance.ca/research/on-farm-research. Summary videos of each trial type are available this year in lieu of an in-person meeting. They may be viewed at manitobapulse.ca/on-farm-network/2020-on-farm-network-results-series.

Thank you for your participation and continued support. This farmer-first research would not be possible without you!

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Important Information to Interpret On-Farm Network Single Page Reports

On-Farm Network field trials are set up using a randomized complete block design (RCBD). Analysis of variance (ANOVA), treating site as a fixed effect and replicate (block) as a random effect, or t-tests, have been conducted to determine yield results. All single page reports and summaries within this document are based on a single-site analysis, i.e., site-years are not combined. Therefore, the effect of treatment across site-years should not be interpreted until a combined analysis has been presented.

Definitions

Site-year: A site-year, identified by a unique trial ID, is one research trial location in one year. For example, a seeding rate trial conducted in a field near Carman would be one site-year.

Confidence level: A 95% confidence level is used within our trials. This means we can say we are 95% certain of the outcome.

P-value: A calculated probability used in statistics to either accept or reject the null hypothesis. The null hypothesis for our trials is that there is no difference between treatment means. A p-value of less than 0.05 suggests that there is enough evidence to reject the null hypothesis, meaning there is a significant difference between treatments. If the p-value is greater than 0.05, then there is not enough evidence to conclude that the observed treatment differences are due to our applied treatment at a 95% confidence level.

Coefficient of Variation (CV): The statistical measure of random variation in a trial. The lower the value, the less variable the data.

Contacts and Questions

For any questions about existing trial data, data analysis, or for assistance with future trial establishment of an existing or new trial type, please contact your commodity organizations.

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Dry Bean Foliar Fungicide Trial

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in dry beans.

Summary: There was no significant yield difference between dry beans with and without a single application of foliar fungicide.

Table 1. Summary of 2020 dry bean foliar fungicide trial yield results by site-year.

Trial ID	Rural Municipality	Bean Class	Product	Seeding Date	Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
					Treated	Untreated				
					lb/ac		lb/ac	%		
DBF01	Rhineland	Pinto	Cotegra	May 25	2834	2969	-135	8.4	0.5431	**No**

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Dry Bean Fungicide Trial

Trial ID: 2020-DBF01 – R.M. of Rhineland

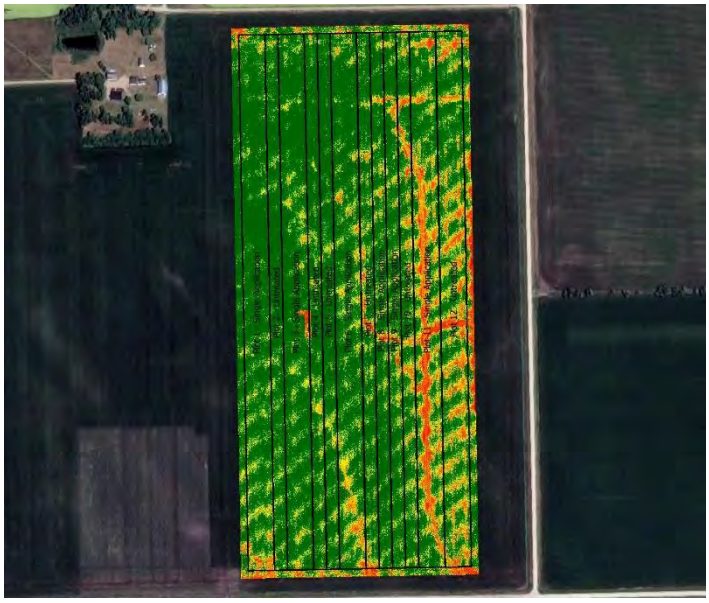
Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in dry beans

Summary: There was a high incidence of foliar and stem anthracnose throughout the trial, however, there was no significant yield difference between pinto beans with and without a single application of Cotegra. Due to the lack of yield response, there was a decrease in profit/ac in the treated area of the trial equivalent to the cost of the fungicide application.

Trial Information

Treatment	Cotegra
Application Timing	R1
Application Date	Jul 17
Application Rate	280 ml/ac
Application Method	Broadcast
Soil Texture	Clay
Previous Crop	Corn
Seeding Date	May 25
Variety	Lumen Pinto Bean
Seeding Rate	88 000 seeds/ac
Row Spacing	30"
Plant Stand @ R4	50 000 plants/ac
Harvest Date	September 19

Field NDVI Image August 17



Precipitation (mm)

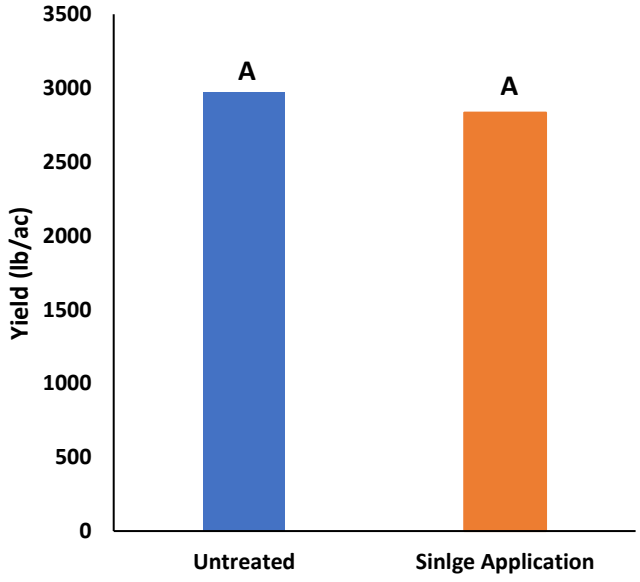
	May	June	July	August
Normal	56.4	85.2	75.4	65.5
Rainfall	10.8	100.2	81.4	111.3

Summary of Disease Rating (R3)ǂ

	Foliar Anthracnose		Stem Anthracnose		White Mould	
	UN	SGL	UN	SGL	UN	SGL
Incidence	100%	93%	97%	97%	0%	7%
Severity	n/a	n/a	n/a	n/a	0.0	0.1

ǂ SGL=single application; Foliar anthracnose (presence/absence), stem anthracnose (presence/absence), white mould 0 – 5 rating scale; bacterial blight present throughout the trial.

Yield by Treatment



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Overall Yield & Economics

	Mean (lb/ac)	Cost ǂ	Change in Profit/ac ǂ ǂ
Single Application	2834	$30/ac	-$30/ac
Untreated	2969		
Yield Difference	-135		
P-Value	0.5431		
CV	8.4%		
Significance	**No**	**Economic**	**No**

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines; cost represents product only, does not include application cost

ǂ ǂ Because yields were not significantly different, there is no increased income to offset the cost of the fungicide. Profit/ac declines by the cost of the fungicide application.

Additional On-Farm Network Research Reports

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NOTES

Dry Bean Nitrogen Fertility Trials

Objective: Quantify the agronomic and economic impacts of nitrogen fertilizer rates in dry beans.

Summary: At the pinto bean trial, there was a significant decrease in yield at the highest N rate. At the black bean trial, yields were not significantly different between N rates.

Table 2. Summary of 2020 dry bean nitrogen fertility trial yield results by site-year.

Trial ID	Rural Municipality	Bean Class	Placement	Seeding Date	Spring Soil N (0-24")	Yield				CV	P-Value	Statistically Significant @ 95%
						105 lb N/ac	70 lb N/ac	35 lb N/ac	0 lb N/ac			
					lb/ac	lb/ac				%		
DBN01	Norfolk-Treherne	Pinto	Broadcast/ Incorporated	Jun 2	34	1846	2156	2270	2243	13.0	0.0172	**Yes**

Trial ID	Rural Municipality	Bean Class	Seeding Date	Yield			CV	P-Value	Statistically Significant @ 95%
				100 lb N/ac	70 lb N/ac	40 lb N/ac			
				lb/ac			%		
DBN02	Morten	Black	Jun 3	2536	2510	2619	3.6	0.3929	**No**

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Dry Bean Nitrogen Fertility Trial

Trial ID: 2020-DBN01 – R.M. of Norfolk Treherne

Objective: Quantify the agronomic and economic impacts of nitrogen fertilizer rates in dry beans

Summary: Nodulation declined as nitrogen rate increased. The 0 and 35 lb N/ac treatments yielded significantly greater than the 105 lb N/ac treatment. The yield of the 70 lb N/ac treatment was not significantly different from yield at the other rates. Nitrogen fertilization was not economic at this trial.

Trial Information

Treatment	0 vs 35 vs 70 vs 105 lb N/ac
Soil Texture	Loamy Fine Sand
Previous Crop	Corn
Tillage	Conventional
Spring Soil Test N	34 lb/ac (0-24")
Seeding Date	June 2
Variety	Vibrant Pinto
Seeding Rate	77 000 seeds/ac
Row Spacing	20"
Plant Stand @ VC	60 000 plants/ac
Harvest Date	September 11

Nodulation†

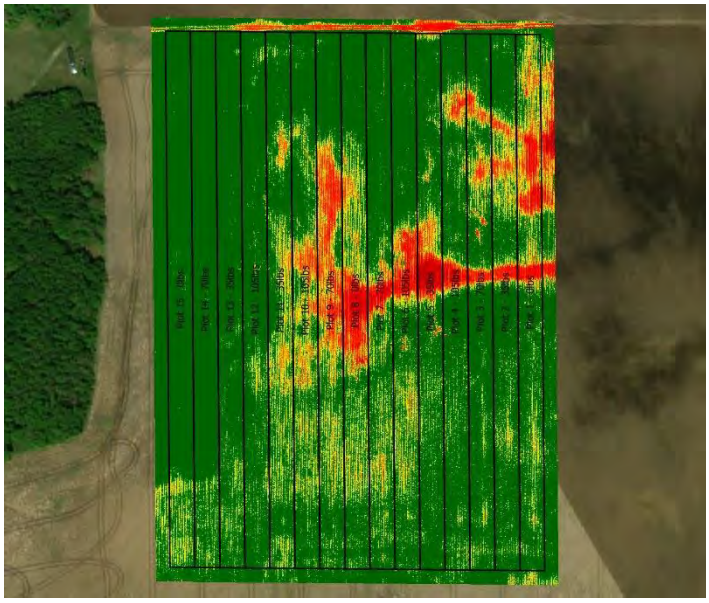
	Average Nodulation Rating @R2†
0 lb N/ac	3.6
35 lb N/ac	3
70 lb N/ac	1.1
105 lb N/ac	0.83

† 0 = no nodules, 1 = Poor (<5/plant), 2 = Fair (<10/plant), 3 = Good (<20/plant), 4 = Excellent (>20/plant)

Soil Test N

Treatment	0-24" Spring (lb N/ac)	0-24" Fall (lb N/ac)
0 lb N/ac	38	42
35 lb N/ac	34	34
70 lb N/ac	31	26
105 lb N/ac	34	26

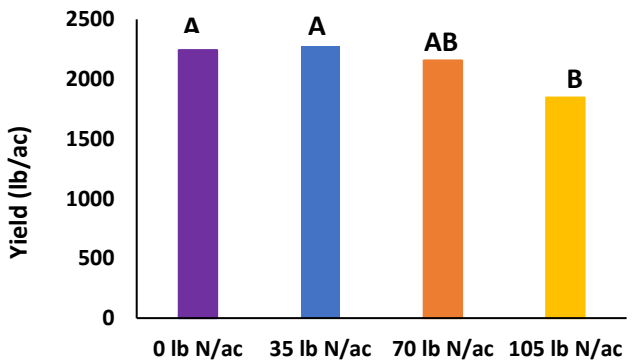
Field NDVI Image July 25



Precipitation (mm)

	May	June	July	August
Normal	58	77.1	76.5	58.7
Rainfall	42.2	40.2	70.7	20.3

Yield by Treatment



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Overall Yield & Economics

	Mean (lb/ac)	Cost ǂ	Change in Profit/ac (@ dry bean price of $0.30-$0.35/lb) ǂǂ
0 lb N/ac	2243		
35 lb N/ac	2270	$16/ac	
70 lb N/ac	2156	$32/ac	
105 lb N/ac	1846	$48/ac	0 lb N/ac → 105 lb N/ac: -$167 to -$188/ac 30 lb N/ac → 105 lb N/ac: -$159 to -$180/ac
P-Value	0.0172		
CV	13%		
Significance	**Yes**	**Economic**	**No**

ǂ Based on estimated urea cost of $472/MT, from an MB Ag survey of retailers

ǂǂ Change in profit/ac is the difference between the change in income/ac, from a significant difference in yield, and the change in cost/ac with increasing N rate. Change in profit/ac is presented as a range across dry bean prices of $0.30/lb to $0.35/lb

Dry Bean Nitrogen Fertility Trial

Trial ID: 2020-DBN02 – R.M. of Morten

Objective: Quantify the agronomic and economic impacts of nitrogen fertilizer rates in dry beans

Summary: Overall nodulation was low at this trial with no apparent pattern corresponding to N rate. Black bean yield did not significantly differ between nitrogen fertilizer rates. As a result, the 70 and 100 lb N/ac rates led to an economic loss equivalent to the increased cost/ac over the low N rate.

Trial Information

Treatment	40 vs 70 vs 100 lb N/ac
Soil Texture	Loamy Clay Loam
Previous Crop	Wheat
Tillage	Spring Harrow
Seeding Date	June 3
Variety	CDC Blackstrap
Seeding Rate	80lbs/ac
Row Spacing	10"
Plant Stand @ VC	131 000 plants/ac
Harvest Date	September 14

Precipitation (mm)

	May	June	July	August
Normal	46.9	83.7	65.2	57.6
Rainfall	21.4	53.8	119.5	29

Nodulation†

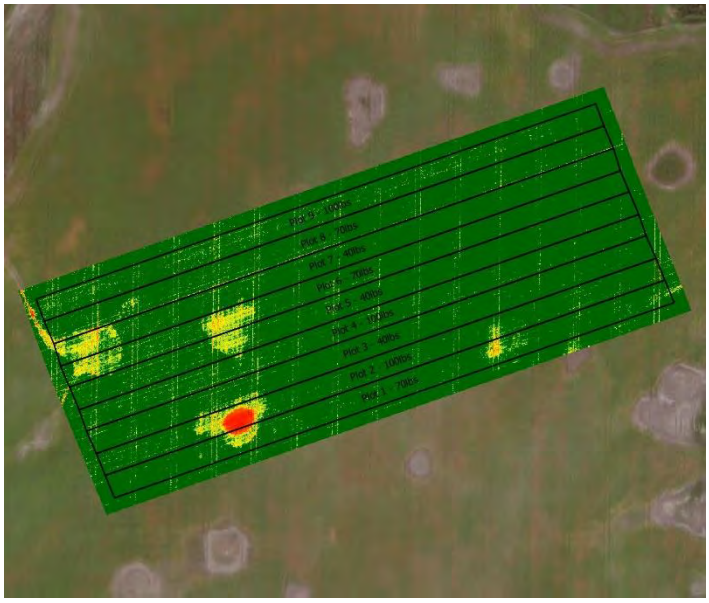
	Average Nodulation Rating @R2†
40 lb N/ac	0.683
70 lb N/ac	1.0
100 lb N/ac	0.86

† 0 = no nodules, 1 = Poor (<5/plant), 2 = Fair (<10/plant), 3 = Good (<20/plant), 4 = Excellent (>20/plant)

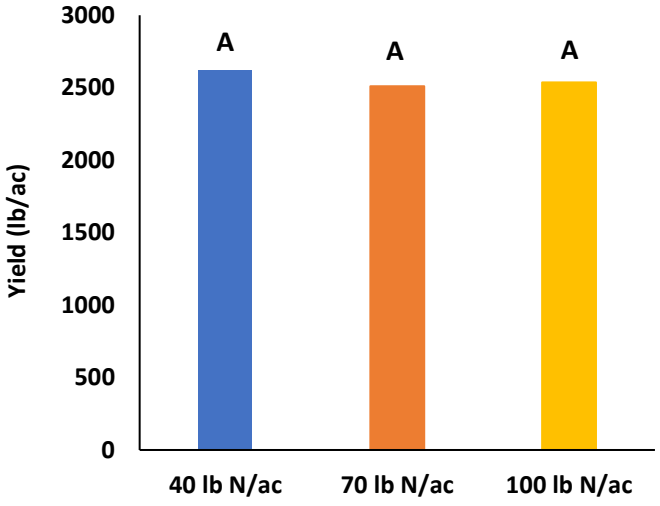
Soil Test N

Treatment	0-24" Fall N (lb N/ac)
40 lb N/ac	24
70 lb N/ac	40
100 lb N/ac	30

NDVI Field Image July 24



Yield by Treatment



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Overall Yield & Economics

	Mean (lb/ac)	Cost ǂ	Change in Profit/ac ǂ ǂ
40 lb N/ac	2619	$18/ac	
70 lb N/ac	2510	$32/ac	-$14/ac
100 lb N/ac	2536	$46/ac	-$28/ac
P-value	0.3929		
CV	3.6%		
Significance	**No**	**Economic**	**No**

ǂ Based on estimated urea cost of $472/MT, from an MB Ag survey of retailers

ǂ ǂ No significant yield difference between N rates to offset the increased cost/ac with increased N rate, therefore profit declines by the change in cost/ac with increasing N rate over 40 lb N/ac.

Additional On-Farm Network Research Reports

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NOTES

Dry Bean Tillage Trial

Objective: Quantify the agronomic and economic impacts of strip-till vs. conventional till systems for dry bean production.

Summary: There was no significant yield difference between strip-tilled and conventional tilled dry beans, however, seedlings in the conventional tilled areas were more affected by spring sandblasting compared to seedlings in strip-tilled areas of the trial.

Table 3. Summary of 2020 dry bean tillage trial yield results by site-year.

Trial ID	Rural Municipality	Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
		Strip-till	Conventional till				
		lb/ac			%		
DBT01	Roland	2629	2304	325	10.4	0.1468	**No**

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Dry Bean Tillage Trial

Trial ID: 2020-DBT01 – R.M. of Roland

Objective: Quantify the agronomic and economic impacts of strip-till vs. conventional till systems for dry bean production

Summary: There was no significant yield difference between tillage systems, however, pinto beans in strip-till plots were less affected by spring sandblasting than pinto beans in conventional till plots. Spring sandblasting can have economic consequences if re-seeding is necessary.

Trial Information[ǂ]

Treatment	Strip vs Conventional Till
Rural Municipality	Roland
Soil Texture	Very Fine Sandy Loam / Clay
Previous Crop	Canola
Seeding Date	May 18
Variety	SV6139R Pinto
Seeding Rate	71 000 seeds/ac
Row Spacing	30"
Plant Stand @ V8	51 000 plants/ac
Harvest Date	August 29

ǂ A 70-30-0-5 fertilizer blend was banded 6" below the seed in the strip-till treatment and broadcast/incorporated in the conventional till treatment

Precipitation (mm)

	May	June	July	August
Normal	53.8	80.6	65.7	71
Rainfall	29.1	69.1	59	26.7

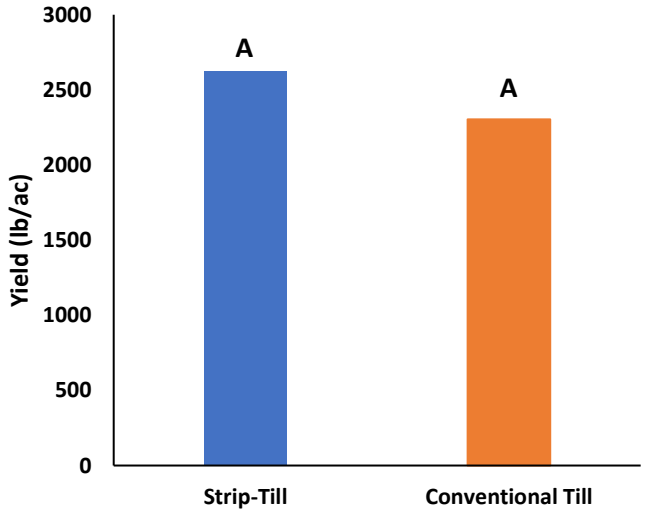
Early Season Observations

Left: sandblasted pinto beans in conventional till plot in early June

Right: strip-till plots were less affected by sandblasting in early June

NDVI Field Image July 25

Yield by Treatment



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Overall Yield & Economics

	Mean (lb/ac)
Strip-Till	2629
Conventional Till	2304
Yield Difference	325
P-Value	0.1468
CV	10.4%
Significance	**No**

Important economic consideration:

- Re-seed due to sandblasting in conventional tilled areas of the trial
- Re-seed operation in dry beans can be in the neighbourhood of **$80/ac**

NOTES

Faba Bean Fungicide Trial

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in faba beans.

Summary: Faba bean yield significantly increased with a single application of fungicide compared to yield where fungicide was not applied.

Table 4. Summary of 2020 faba bean foliar fungicide trial yield results by site-year.

Trial ID	Rural Municipality	Product	Row Spacing	Plant Stand Midseason	Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
					Single App	Untreated				
			inch	'000/ac	bu/ac		bu/ac	%		
FF01	Swan Valley West	Dyax	10	93	77.2	61.5	**15.7**	13	0.0041	**Yes**

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Faba Bean Fungicide Trial

Trial ID: 2020-FBF01 – R.M. of Swan Valley West

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in faba beans

Summary: Foliar ascochyta and chocolate spot were prevalent throughout the trial. Yield of faba beans with a single application of Dyax was significantly greater than yield of untreated faba beans. Profit/ac increased as a result.

Trial Information

Treatment	Dyax
Application Timing	Flowering
Application Date	July 16
Application Rate	160 ml/ac
Application Method	Broadcast
Soil Texture	Clay
Previous Crop	Wheat
Tillage	Conventional
Seeding Date	May 2
Variety	Snowdrop
Seeding Rate	220 lbs/ac
Row Spacing	10"
Plant Stand @ R5	93 000 plants/ac
Harvest Date	September 28

Precipitation (mm)

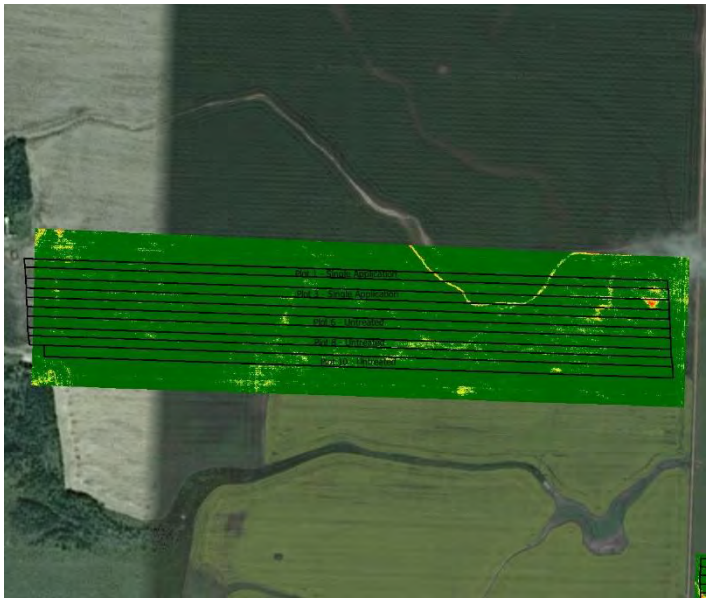
	May	June	July	August
Normal	45.4	84.2	85.6	68.3
Rainfall	11	86.6	143.7	66.9

Summary of Disease Rating (R5)ǂ

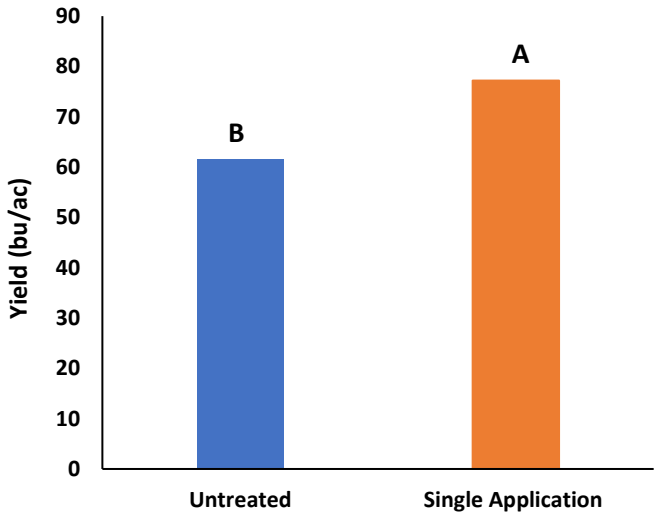
	Foliar Ascochtya		Chocolate Spot	
	UN	SGL	UN	SGL
Incidence	94%	90%	88%	80%
Severity	3.24	2.62	2.48	1.84

ǂ SGL=Single application; Foliar ascochyta 1 – 7 rating scale, chocolate spot 1 – 5 rating scale

NDVI Field Image July 29



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac (@ faba bean price of $7 - $9/bu) ǂǂ
Single Application	77.2	$14/ac	+$96 to +$127/ac
Untreated	61.5		
Yield Difference	15.7		
P-Value	0.0041		
CV	13%		
Significance	**Yes**	**Economic**	**Yes**

ǂ Based on estimated cost for faba bean fungicide; product only, does not include cost of application

ǂ ǂ Change in profit/ac is calculated as the difference between the change in income/ac from a significant yield difference and the cost/ac of the fungicide. Profit is presented as a range across faba bean prices of $7/bu to $9/bu

NOTES

Faba Bean Seeding Rate Trial

Objective: Quantify the agronomic and economic impacts of different faba bean seeding rates.

Summary: There was no significant yield difference between faba bean seeding rates.

Table 5. Summary of 2020 faba bean seeding rate trial yield results by site-year.

Trial ID	Rural Municipality	Seeding Date	Row Spacing	Plant Stand @ V5			Yield			CV	P-Value	Statistically Significant @ 95%
				341lb	284lb	228lb	341lb	284lb	228lb			
			inch	'000/ac			bu/ac			%		
FP01	Swan Valley West	May 7	12	213	128	156	53.3	54.7	56.2	3.9	0.1210	**No**

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Faba Bean Seeding Rate Trial

Trial ID: 2020FP01 – R.M. of Swan Valley West

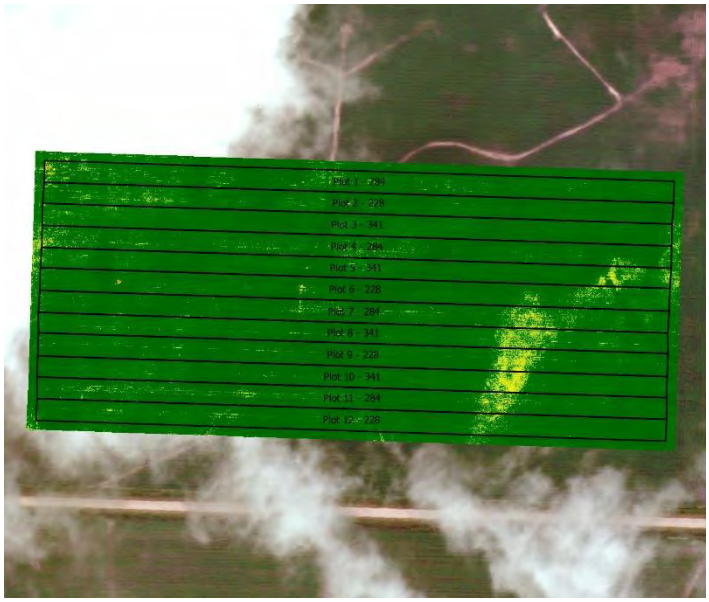
Objective: Quantify the agronomic and economic impacts of different faba bean seeding rates

Summary: There was no significant yield difference between seeding rates, therefore, there was an economic loss equivalent to the increased cost/ac of the higher seeding rates.

Trial Information

Treatment	228 vs 284 vs 341 lb/ac
Soil Texture	Clay Loam
Previous Crop	Canola
Tillage	Conventional
Seeding Equipment	Air Drill
Seeding Date	May 7
Variety	Snowbird
Row Spacing	12”
Harvest Date	September 29

NDVI Field Image July 29



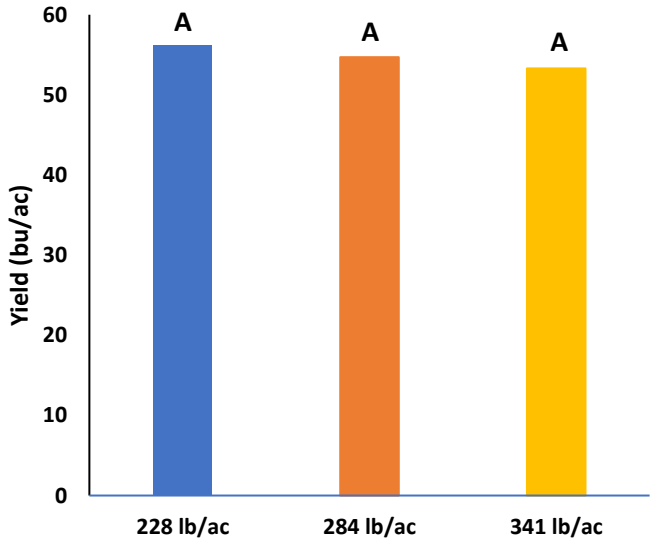
Precipitation (mm)

	May	June	July	August
Normal	45.4	84.2	85.6	68.3
Rainfall	11	86.6	143.7	66.9

Plant Stand (plants/ac)

	V5
228 lb/ac	155 500
284 lb/ac	128 000
341 lb/ac	212 500

Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
228 lb/ac	56.2	$51/ac	
284 lb/ac	54.7	$64/ac	-$13/ac
341 lb/ac	53.3	$77/ac	-$26/ac
P-Value	0.1210		
CV	3.9%		
Significance	**No**	**Economic**	**No**

† Based on estimated seed cost of $13.50/bu

†† Change in profit/ac is calculated as the difference in cost between seeding rate treatments. Yields were not significantly different, so there is no increased income to offset the increase in seed cost

NOTES

Field Pea Foliar Boron Trials

Objective: Quantify the agronomic and economic impacts of foliar boron application in field peas.

Summary: There was no significant yield difference between peas with and without a foliar boron application.

Table 6. Summary of 2020 pea foliar boron fertility trial yield results by site-year.

Trial ID	Rural Municipality	Placement	Application Stage	Soil Boron	Yield		CV	P-Value	Statistically Significant @ 95%
					Treated	Untreated			
				ppm	bu/ac		%		
PB01	Swan Valley West	Foliar	Full Flower	0.8 (Fall 19)	82.4	81.6	2.2	0.3286	**No**
PB02	Swan Valley West	Foliar	Full Flower		73.5	74.9	5.9	0.8528	**No**
PB03	Swan Valley West	Foliar	Full Flower	1.7 (Fall 19)	100.3	95.9	7.8	0.3686	**No**

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Pea Foliar Boron Trial

Trial ID: 2020-PB01 – R.M. of Swan Valley West

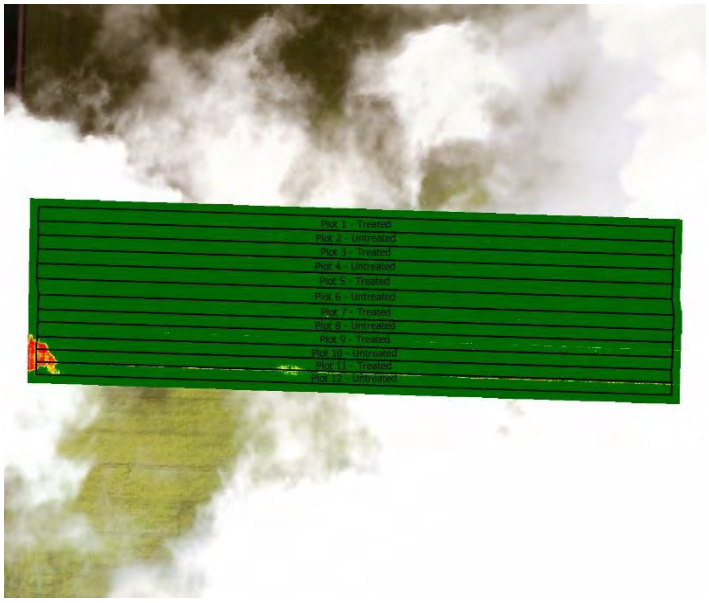
Objective: Quantify the agronomic and economic impacts of foliar boron application in field peas

Summary: Pod counts were very similar between treated and untreated peas. There was no significant yield difference between peas with and without a foliar application of boron. As a result, for the treated area, there was a loss in profit/ac equivalent to the cost of application per acre.

Trial Information

Treatment	Treated and Untreated
Application Timing	Full Flower
Application Date	July 7
Application Rate	0.5 L/ac
Application Method	Broadcast
Soil Texture	Clay Loam
Fall 2019 Soil Boron	0.8 ppm (0-6")
Previous Crop	Wheat
Tillage	Conventional
Seeding Date	May 7
Variety	CDC Inca
Seeding Rate	210 lb/ac
Row Spacing	12"
Harvest Date	August 27

NDVI Field Image July 29



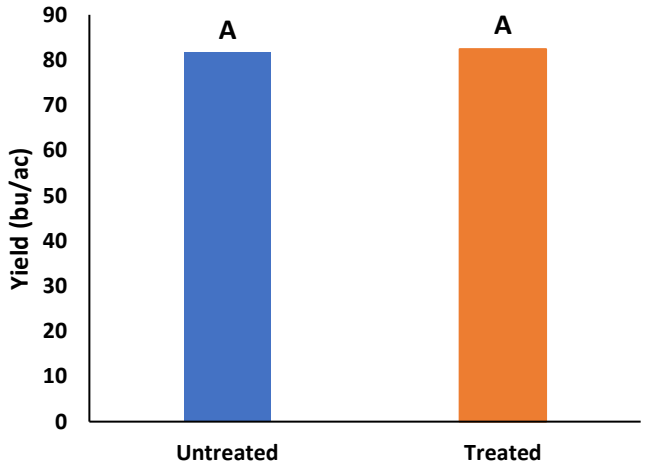
Precipitation (mm)

	May	June	July	August
Normal	45.4	84.2	85.6	68.3
Rainfall	11	86.6	143.7	66.9

Pod Counts (R4)

	Avg # Pods/Plant
Treated	11.8
Untreated	11.1

Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Treated	82.4	$10/ac	-$10/ac
Untreated	81.6		
Yield Difference	0.8		
P-Value	0.3286		
CV	2.2%		
Significance	**No**	**Economic**	**No**

† Based on estimated cost of $10/ac for foliar boron; product only, does not include application cost

†† No significant yield difference, so there is no increase in yield to offset the cost of the product

Pea Foliar Boron Trial

Trial ID: 2020-PB02 – R.M. of Swan Velley West

Objective: Quantify the agronomic and economic impacts of foliar boron application in field peas

Summary: Pod counts were similar between treatments. There was no significant yield difference between peas with and without a foliar boron application. As a result, for the treated area, there was a loss in profit/ac equivalent to the cost of application per acre.

Trial Information

Treatment	Treated vs Untreated
Application Timing	Full Flower
Application Date	July 7
Application Rate	0.5L/ac
Application Method	Broadcast
Soil Texture	Very Fine Sandy Loam
Previous Crop	Canola
Tillage	Conventional
Seeding Date	May 4
Variety	CDC Inca
Seeding Rate	210 lb/ac
Row Spacing	10”
Harvest Date	August 20

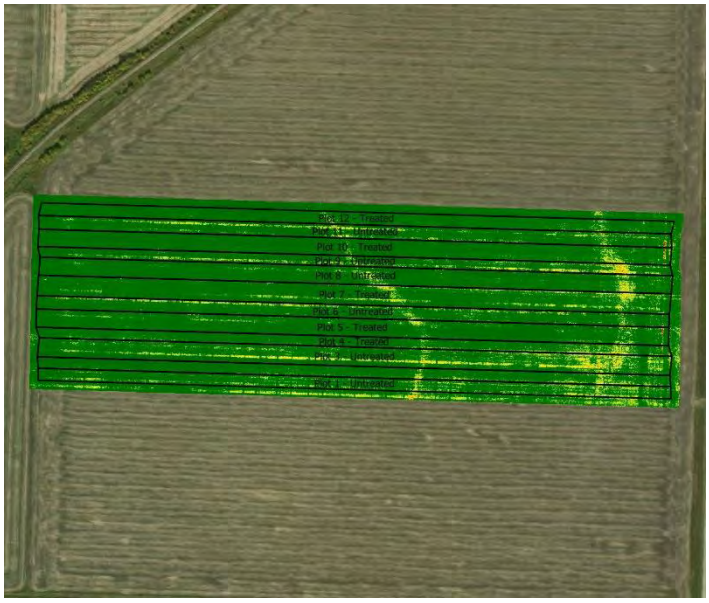
Precipitation (mm)

	May	June	July	August
Normal	45.4	84.2	85.6	68.3
Rainfall	12.1	62.9	122.8	43.4

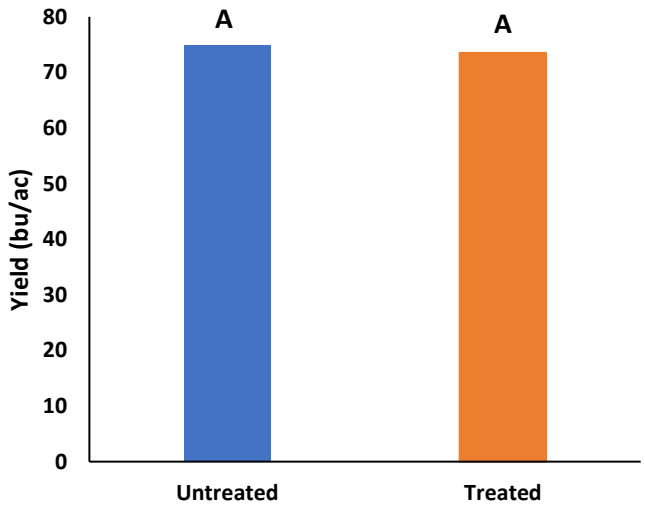
Pod Counts (R4)

	Avg # Pods/Plant
Treated	10.1
Untreated	10.5

NDVI Field Image July 29



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Treated	73.5	$10/ac	-$10/ac
Untreated	74.9		
Yield Difference	-1.4		
P-Value	0.8528		
CV	5.9%		
Significance	**No**	**Economic**	**No**

† Based on estimated cost of $10/ac for foliar boron; product only, does not include application cost

†† No significant yield difference, so there is no increase in yield to offset the cost of the product

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Pea Foliar Boron Trial

Trial ID: 2020-PB03 – R.M. of Swan Velley West

Objective: Quantify the agronomic and economic impacts of foliar boron application in field peas

Summary: Pod counts were similar between treatments. There was no significant yield difference between peas with and without a foliar boron application. As a result, for the treated area, there was a loss in profit/ac equivalent to the cost of application per acre.

Trial Information

Treatment	Treated vs Untreated
Application Timing	Full Flower
Application Date	July 7
Application Rate	0.5La/ac
Application Method	Broadcast
Soil Texture	Clay Loam
Fall 2019 Soil Boron	1.7 ppm (0-6")
Previous Crop	Canola
Tillage	Conventional
Seeding Date	May 11
Variety	Abarth
Seeding Rate	210 lb/ac
Row Spacing	10"
Harvest Date	August 20

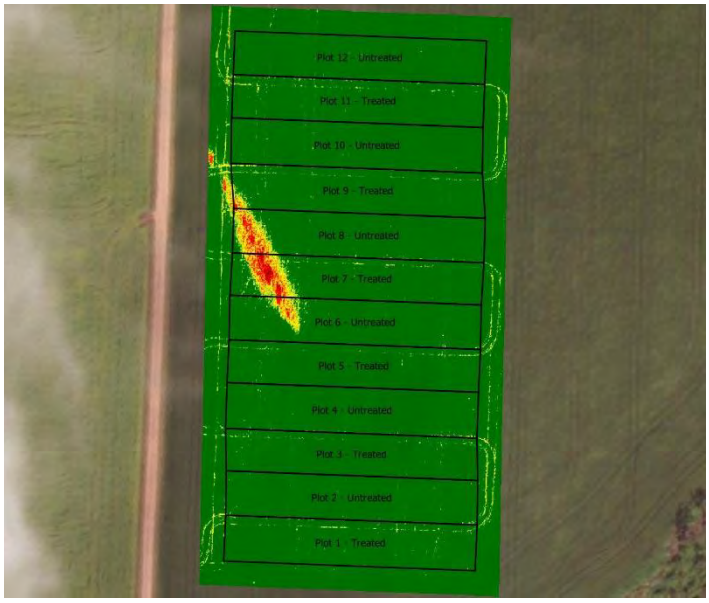
Precipitation (mm)

	May	June	July	August
Normal	45.4	84.2	85.6	68.3
Rainfall	11	86.6	143.7	66.9

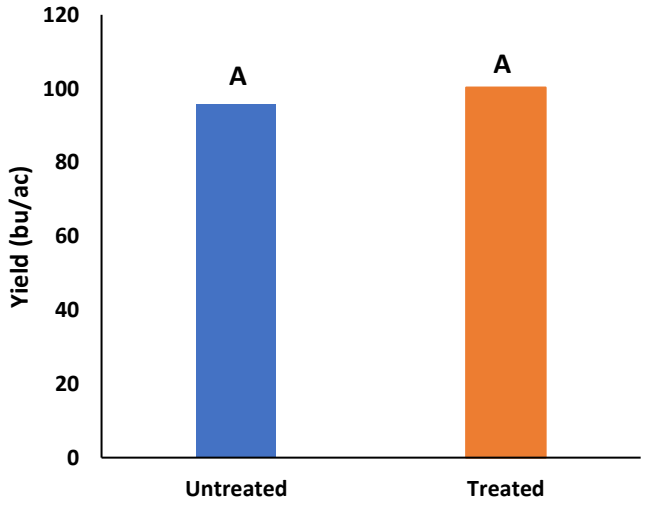
Pod Counts (R4)

	Avg # pods/plant
Treated	10.2
Untreated	10.4

NDVI Field Image July 29



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Treated	100.3	$10/ac	-$10/ac
Untreated	95.9		
Yield Difference	4.4		
P-Value	0.3686		
CV	7.8		
Significance	**No**	**Economic**	**No**

† Based on estimated cost of $10/ac for foliar boron; product only, does not include application cost

†† No significant yield difference, so there is no increase in yield to offset the cost of the product

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NOTES

Field Pea Foliar Fungicide Trials

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in field peas.

Summary: For single vs. no application trials, there was no significant yield difference between treatments. For double vs. no application and double vs. single application trials, the double application significantly increased yield over the other treatment at each trial.

Table 7. Summary of 2020 field pea foliar fungicide trial yield results by site-year.

Trial ID	Rural Municipality	Product	Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
			Single App	Untreated				
			------ bu/ac -----		bu/ac	%		
PF01	Woodlands	Dyax	63.6	63.6	0.0	4.3	0.9529	**No**
PF02	Dauphin	Dyax	97.2	95.7	1.5	2.1	0.2318	**No**
PF03	Rockwood	Dyax	53.5	52.2	1.3	5.1	0.3018	**No**
PF04	Grassland	MIRAVIS Neo 300SE	76.3	70.8	5.5	6.0	0.07	**No**
PF05	North Cypress-Langford	Dyax	37.5	37.8	-0.3	4.5	0.8294	**No**
PF06	Westlake-Gladstone	Dyax	91.0	89.1	1.9	4.5	0.3244	**No**

Trial ID	Rural Municipality	Product	Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
			Double App	Single App				
			-------- bu/ac --------		bu/ac	%		
PF09	Swan Valley West	Headline/Cotegra	88.1	80.9	**7.2**	5.3	0.0051	**Yes**

Trial ID	Rural Municipality	Product	Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
			Double App	Untreated				
			------- bu/ac ------		bu/ac	%		
PF08	Swan Valley West	Cotegra/Delaro	76.4	71.9	**4.5**	6.7	0.0015	**Yes**

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Pea Fungicide Trial

Trial ID: 2020-PF01 – R.M. of Woodlands

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in field peas

Summary: Foliar and stem ascochyta were prevalent throughout the trial at low levels. There was no significant yield difference between peas with and without a single application of Dyax. As a result, profit/ac in the treated area of the trial decreased by the cost/ac of fungicide application.

Trial Information

Treatment	Dyax
Application Timing	R1
Application Date	June 24
Application Rate	160 ml/ac
Application Method	Broadcast
Soil Texture	Clay Loam
Previous Crop	Wheat
Tillage	Zero Till
Seeding Date	May 7
Variety	AAC Carver
Seeding Rate	204 lbs/ac
Row Spacing	10"
Plant Stand @ R3	288 000 plants/ac
Harvest Date	Aug 7

Precipitation (mm)

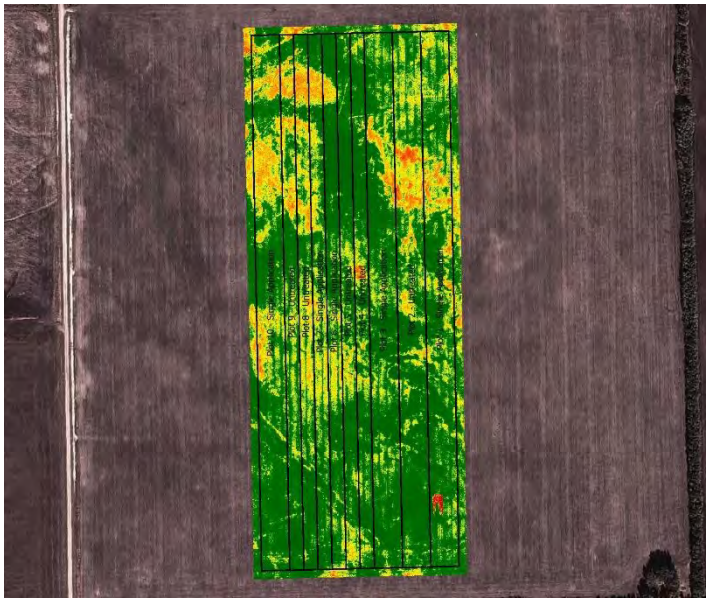
	May	June	July	August
Normal	53.8	92	66.4	63.3
Rainfall	36.2	51	47.1	91.5

Summary of Disease Rating (R3)ǂ

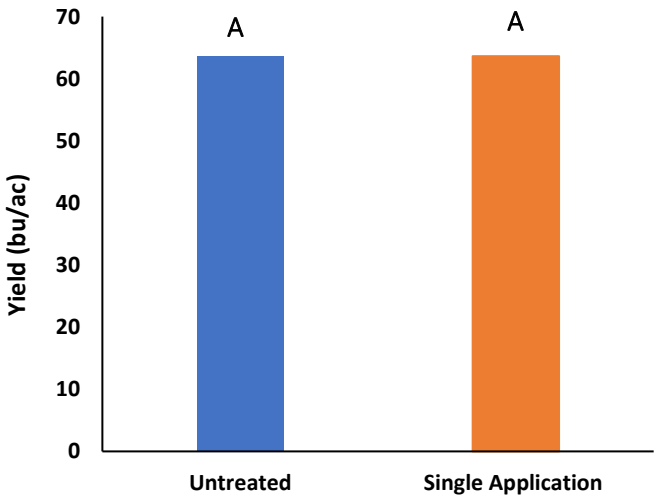
	Foliar Ascochtya		Stem Ascochyta	
	UN	SGL	UN	SGL
Incidence	100%	100%	100%	98%
Severity	2.8	2.7	2.4	2.2

ǂ SGL=Single application; Foliar ascochyta 1 – 7 rating scale, stem ascochyta 1-7 rating scale

NDVI Field Image July 29



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Single Application	63.6	$20/ac	-$20/ac
Untreated	63.6		
Yield Difference	0.0		
P-Value	0.9529		
CV	4.3%		
Significance	**No**	**Economic**	**No**

† Based on MB Agriculture 2020 Cost of Production Guidelines; product cost only, does not include application cost

†† Because yields were not significantly different, there is no increased income to offset the cost of the fungicide. Profit/ac declined by the cost of the fungicide application.

Pea Fungicide Trial

Trial ID: 2020-PF02 – R.M. of Dauphin

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in field peas

Summary: Foliar and stem ascochtya was prevalent throughout the trial at low levels. There was no significant yield difference between peas with and without a single application of Dyax. Due to the lack of yield response, there was a decrease in profit/ac in the treated area of the trial equivalent to the cost of the fungicide application.

Trial Information

Treatment	Dyax
Application Timing	R1
Application Date	June 26
Application Rate	160 ml/ac
Application Method	Aerial
Soil Texture	Loamy Clay Loam
Previous Crop	Wheat
Tillage	Conventional
Seeding Date	April 28
Variety	AAC Carver
Seeding Rate	180 lbs/ac
Row Spacing	10”
Plant Stand @ R3	186 000 plants/ac
Harvest Date	August 7

Precipitation (mm)

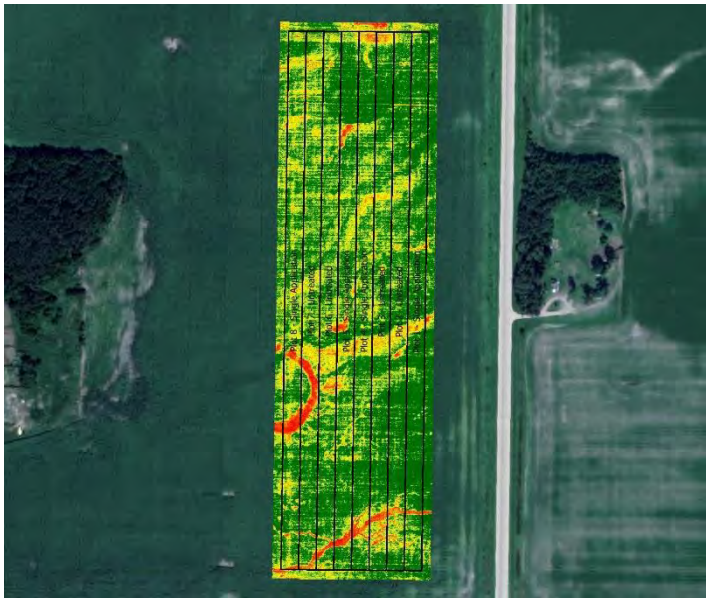
	May	June	July	August
Normal	54.3	86.7	73.2	63.3
Rainfall	31.8	101	67.9	98.4

Summary of Disease Rating (R3)ǂ

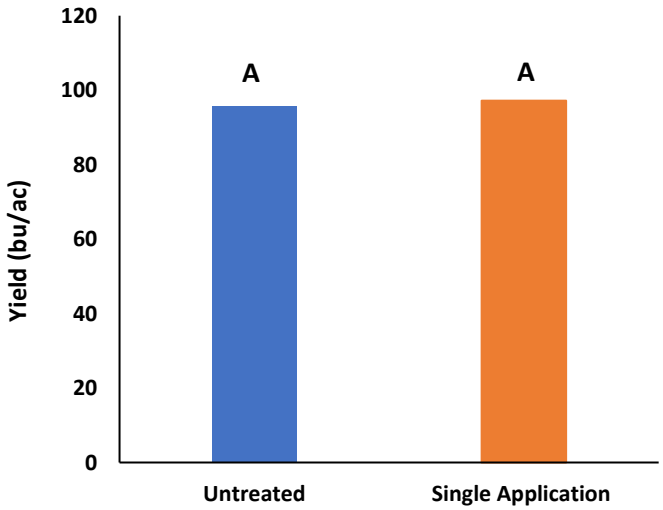
	Foliar Ascochtya		Stem Ascochyta	
	UN	SGL	UN	SGL
Incidence	100%	100%	100%	63%
Severity	2.3	2.0	2.0	1.6

ǂ SGL=single application; Foliar ascochyta 1 – 7 rating scale, stem ascochyta 1 – 7 rating scale

NDVI Field Image July 28



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in profit/ac ǂ ǂ
Single Application	97.2	$20/ac	-$20/ac
Untreated	95.7		
Yield Difference	1.5		
P-Value	0.2318		
CV	2.1%		
Significance	**No**	**Economic**	**No**

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines; product cost only, does not include application cost

ǂ ǂ Because yields were not significantly different, there is no increased income to offset the cost of the fungicide. Profit/ac declines by the cost of the fungicide application.

Pea Fungicide Trial

Trial ID: 2020-PF03 – R.M. of Rockwood

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in field peas

Summary: Foliar and stem ascochyta were prevalent throughout the trial at low levels. There was no significant yield difference between peas with and without a single application of Dyax. Due to the lack of yield response, there was a decrease in profit/ac in the treated area of the trial, equivalent to the cost of the fungicide application.

Trial Information

Treatment	Dyax
Application Timing	R1
Application Date	June 29
Application Rate	160 ml/ac
Application Method	Broadcast
Soil Texture	Very Fine Sandy Loam
Previous Crop	Canola
Tillage	Conventional
Seeding Date	May 10
Variety	AAC Carver
Seeding Rate	180 lbs/ac
Row Spacing	10"
Plant Stand @ R3	151 000 plants/ac
Harvest Date	August 11

Precipitation (mm)

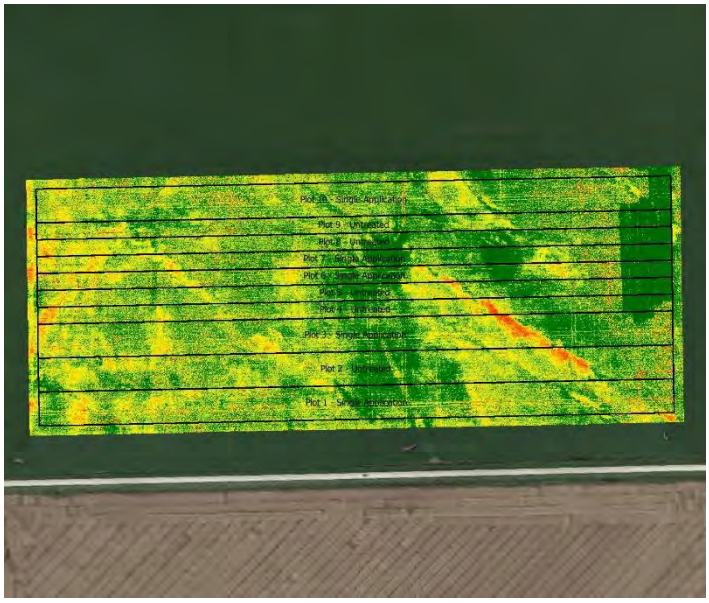
	May	June	July	August
Normal	53.8	92	66.4	63.3
Rainfall	31.1	57.6	37.3	91.2

Summary of Disease Rating (R3)ǂ

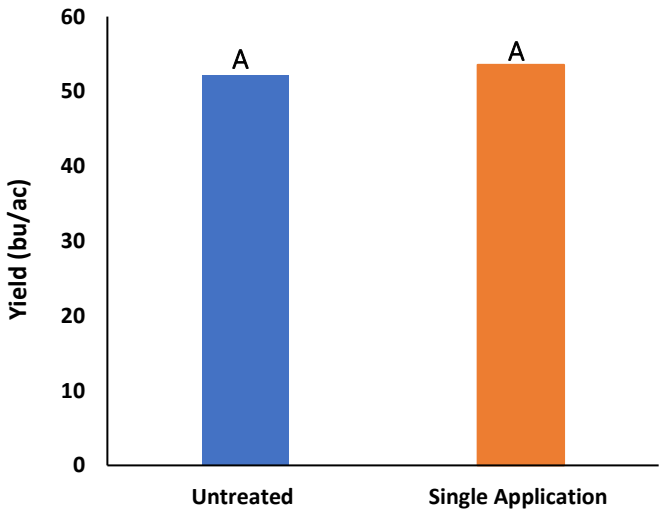
	Foliar Ascochtya		Stem Ascochyta	
	UN	SGL	UN	SGL
Incidence	100%	100%	100%	100%
Severity	2.5	2.6	2.0	2.0

ǂ SGL=Single application; Foliar ascochyta 1 – 7 rating scale, stem ascochyta 1 – 7 rating scale

NDVI Field Image July 22



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Single Application	53.5	$20/ac	-$20/ac
Untreated	52.2		
Yield Difference	1.3		
P-Value	0.3018		
CV	5.1%		
Significance	**No**	**Economic**	**No**

† Based on MB Agriculture 2020 Cost of Production Guidelines; product cost only, does not include application cost

†† Because yields were not significantly different, there is no increased income to offset the cost of the fungicide. Profit/ac declines by the cost of the fungicide application.

Pea Fungicide Trial

Trial ID: 2020-PF04 – R.M. of Grassland

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in field peas

Summary: There was no significant yield response to a single application of MIRAVIS Neo 300SE compared to no application. However, there was a replication that did not behave consistently in yield difference with the remainder of the reps. There was no basis for removing this replication from the dataset, but it is important to note that its inclusion is what led to the lack of significant yield difference at this trial. Due to the lack of yield response, there was a decrease in profit/ac in the treated area of the trial, equivalent to the cost of the fungicide application.

Trial Information

Treatment	MIRAVIS Neo 300SE
Application Timing	R1
Application Date	July 3
Application Rate	405 ml/ac
Application Method	Broadcast
Soil Texture	Loam
Previous Crop	Canola
Tillage	Zero Till
Seeding Date	May 23
Variety	AAC Carver
Seeding Rate	185 lbs/ac
Row Spacing	10”
Plant Stand @ R3	256 000 plants/ac
Harvest Date	August 24

Precipitation (mm)

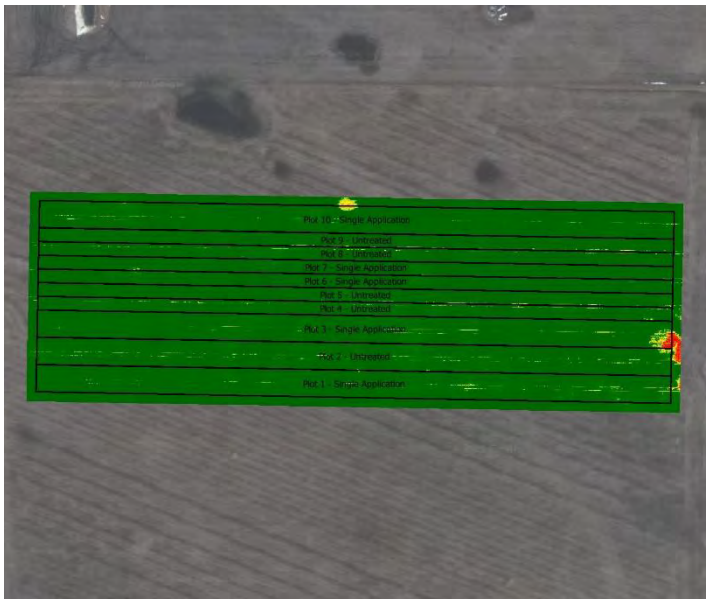
	May	June	July	August
Normal	61.1	89.8	68.3	72.3
Rainfall	16.8	54.2	39.9	22

Summary of Disease Rating (R3)ǂ

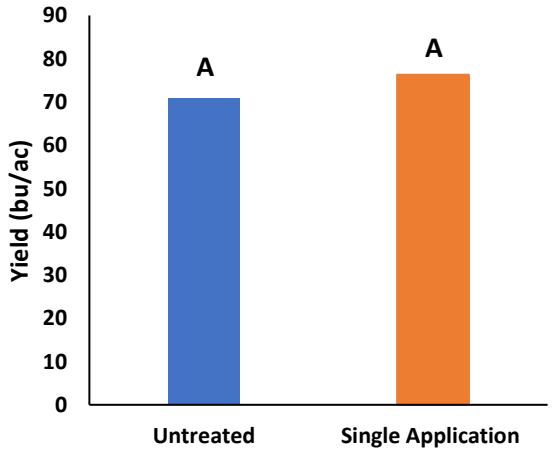
	Foliar Ascochtya		Stem Ascochyta	
	UN	SGL	UN	SGL
Incidence	100%	100%	100%	100%
Severity	2.2	1.8	2.2	1.8

ǂ SGL=single application; Foliar ascochyta 1 – 7 rating scale, stem ascochyta 1 – 7 rating scale

NDVI Field Image July 24



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac) ǂ	Cost ǂ ǂ	Change in Profit/ac ǂ ǂ ǂ
Single Application	76.3	$20/ac	-$20/ac
Untreated	70.8		
Yield Difference	5.5		
P-Value	0.0700		
CV	6.0%		
Significance	**No** ǂ	**Economic**	**No**

ǂ One rep did not behave the same as the rest of the trial, leading to the lack of significant yield response

ǂ ǂ Based on MB Agriculture 2020 Cost of Production Guidelines; product cost only, does not include application cost

ǂ ǂ ǂ Because yields were not significantly different, there is no increased income to offset the cost of the fungicide. Profit/ac declines by the cost of the fungicide application.

Pea Fungicide Trial

Trial ID: 2020-PF05 – R.M. of North Cypress-Langford

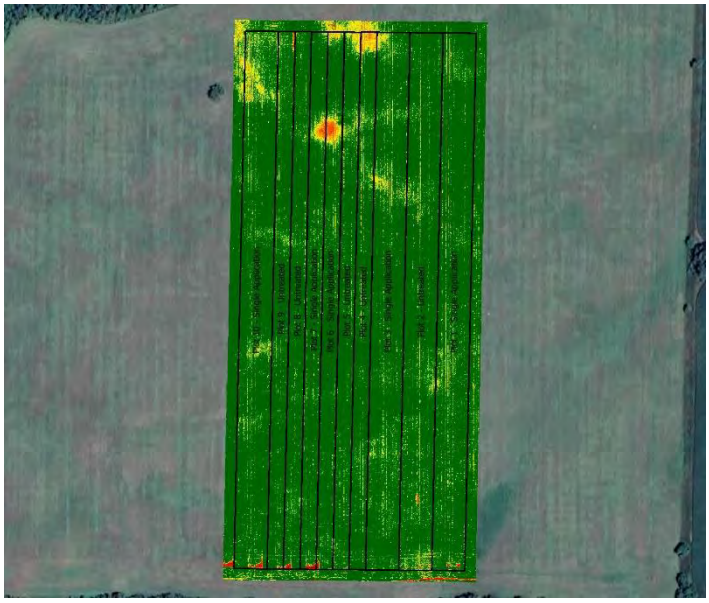
Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in field peas

Summary: Foliar and stem ascochyta were prevalent throughout the trial at low levels. There was no significant yield difference between peas with and without a single application of Dyax. Due to the lack of yield response, there was a decrease in profit/ac in the treated area of the trial equivalent to the cost of the fungicide application.

Trial Information

Treatment	Dyax
Application Timing	R1
Application Date	July 20
Application Rate	160 ml/ac
Application Method	Broadcast
Soil Texture	Loam / Loamy Fine Sand
Previous Crop	Fall Rye
Tillage	Zero Till
Seeding Date	May 12
Variety	Stockade
Seeding Rate	180 lbs/ac
Row Spacing	10"
Plant Stand @ R3	179 000 plants/ac
Harvest Date	August 24

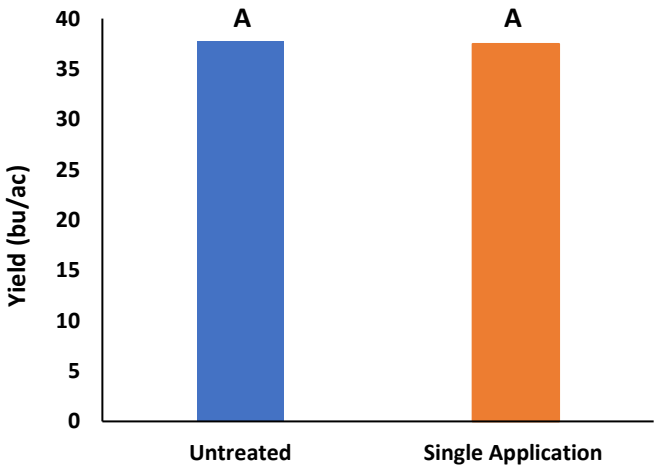
NDVI Field Image July 23



Precipitation (mm)

	May	June	July	August
Normal	56.5	78	80.2	68.7
Rainfall	7.9	100.8	79.8	45.1

Yield by Treatment



Summary of Disease Rating (R3)ǂ

	Foliar Ascochtya		Stem Ascochyta	
	UN	SGL	UN	SGL
Incidence	100%	100%	100%	100%
Severity	2.2	2.0	2.2	2.0

ǂ SGL=Single application; Foliar ascochyta 1 – 7 rating scale, stem ascochyta 1 – 7 rating scale

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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac ǂ ǂ
Single Application	37.5	$20/ac	-$20/ac
Untreated	37.8		
Yield Difference	-0.3		
P-Value	0.8294		
CV	4.5%		
Significance	**No**	**Economic**	**No**

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines; product cost only, does not include application cost

ǂ ǂ Because yields were not significantly different, there is no increased income to offset the cost of the fungicide. Profit/ac declines by the cost of the fungicide application.

Pea Fungicide Trial

Trial ID: 2020-PF06 – R.M. of Westlake-Gladstone

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in field peas

Summary: Foliar and stem ascochyta were prevalent throughout the trial at low levels. There was no significant yield difference between peas with and without a single application of foliar fungicide. Due to the lack of yield response, there was a decrease in profit/ac in the treated area of the trial, equivalent to the cost of the fungicide application.

Trial Information

Treatment	Dyax
Application Timing	R2
Application Date	July 3
Application Rate	160 ml/ac
Application Method	Broadcast
Soil Texture	Fine Sandy Loam
Previous Crop	Wheat
Tillage	Conventional
Seeding Date	May 15
Variety	AAC Chrome
Seeding Rate	200 lbs/ac
Row Spacing	10”
Plant Stand @ R3	213 000 plants/ac
Harvest Date	August 15

Precipitation (mm)

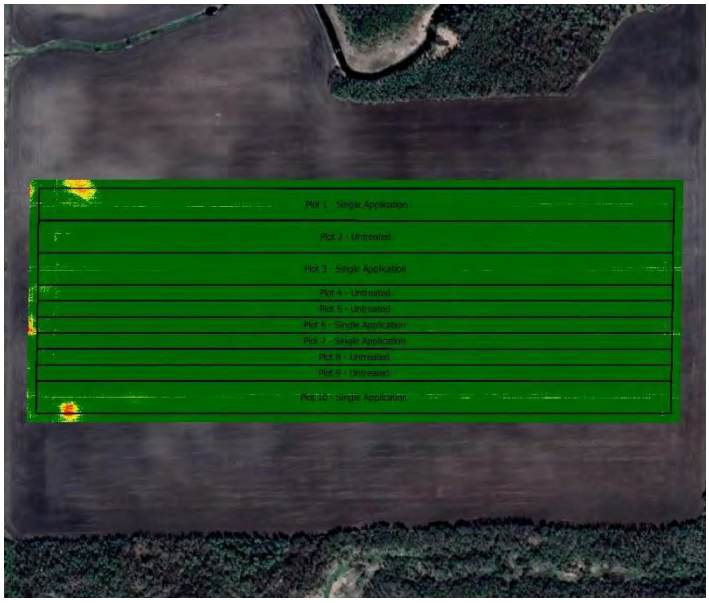
	May	June	July	August
Normal	49.7	76.9	61.7	64.3
Rainfall	6.9	92	59.6	44.1

Summary of Disease Rating (R3)ǂ

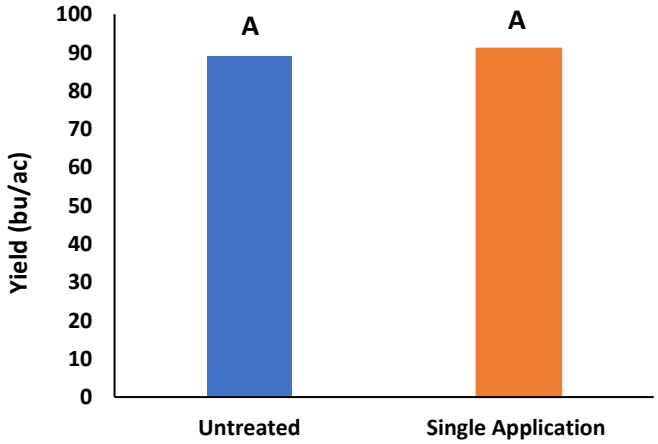
	Foliar Ascochtya		Stem Ascochyta	
	UN	SGL	UN	SGL
Incidence	100%	100%	100%	100%
Severity	2.5	2.0	2.7	2.0

ǂ SGL=Single application; Foliar ascochyta 1 – 7 rating scale, stem ascochyta 1 – 7 rating scale

NDVI Field Image July 23



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac ǂ ǂ
Single Application	91.0	$20/ac	-$20/ac
Untreated	89.1		
Yield Difference	1.9		
P-Value	0.3244		
CV	4.5%		
Significance	**No**	**Economic**	**No**

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines; product cost only, does not include application cost

ǂ ǂ Because yields were not significantly different, there is no increased income to offset the cost of the fungicide. Profit/ac declines by the cost of the fungicide application.

Pea Fungicide Trial

Trial ID: 2020-PF08 – R.M. of Swan Valley West

Objective: Quantify the agronomic and economic impacts of a double foliar fungicide application in field peas

Summary: Foliar ascochyta, stem ascochyta and white mould were present throughout the trial. There was also higher than normal rainfall in July, contributing to disease development. There was a significant yield increase of 4.5 bu/ac for peas with a double fungicide application compared to peas with no fungicide applied, however, this increase was not enough to offset the cost of the double application.

Trial Information

Treatment	Cotegra / Delaro
Application Timing	Early Flower
Application Date	July 7 / July 14
Application Rate	280 ml/ac / 365 ml/ac
Application Method	Broadcast
Soil Texture	Very Fine Sandy Loam
Previous Crop	Canola
Tillage	Conventional
Seeding Date	May 14
Variety	Abarth
Seeding Rate	240 lbs/ac
Row Spacing	10”
Plant Stand @ R3	267 000 plants/ac
Harvest Date	August 19

Precipitation (mm)

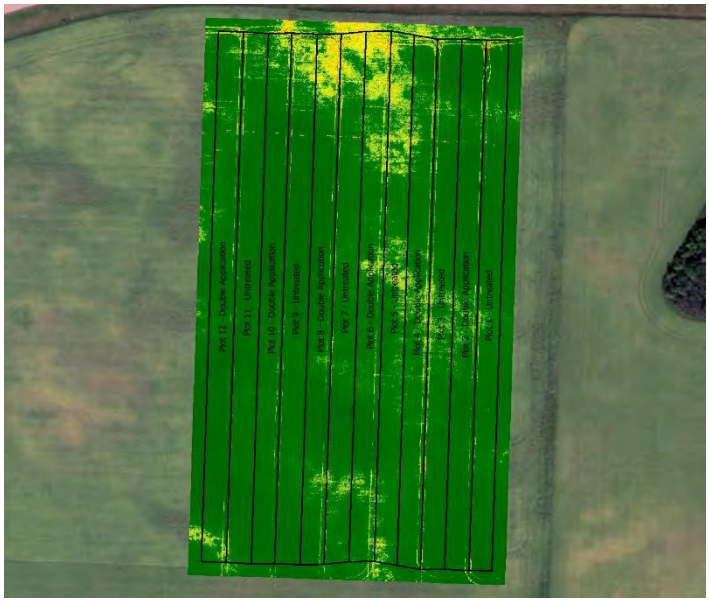
	May	June	July	August
Normal	45.4	84.2	85.6	68.3
Rainfall	11	86.6	143.7	66.9

Summary of Disease Rating (R3)ǂ

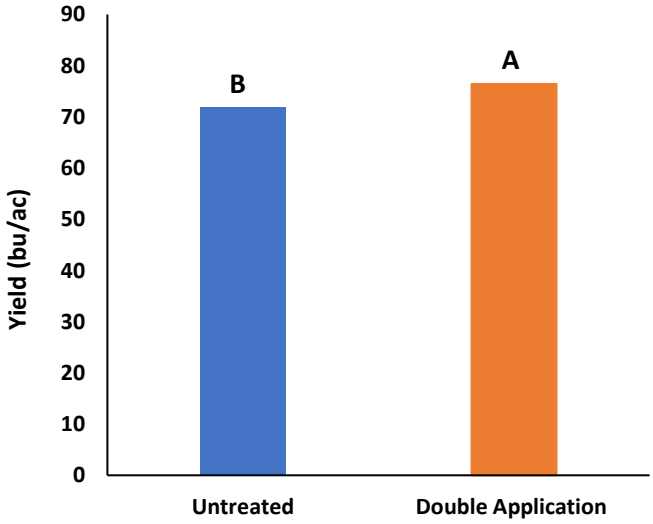
	Foliar Ascochtya		Stem Ascochyta		White Mould	
	UN	DBL	UN	DBL	UN	DBL
Incidence	60%	60%	38%	17%	78%	75%
Severity	1.5	1.8	1.2	1.4	0.8	0.8

ǂ DBL=Double application; Foliar ascochyta 1 – 7 rating scale, stem ascochyta 1 – 7 rating scale, white mould 0 – 5 rating scale

NDVI Field Image July 29



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac (@ pea price of $6 - $8/bu) ǂ ǂ
Double Application	76.4	$40/ac	-$13 to -$4/ac
Untreated	71.9		
Yield Difference	4.5		
P-Value	0.0015		
CV	6.7%		
Significance	**Yes**	**Economic**	**No**

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines ($20/ac for single application); product cost only, does not include application cost

ǂ ǂ Change in profit is calculated as the difference between the change in income from the significant difference in yield and the cost of the product/ac

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Pea Fungicide Trial

Trial ID: 2020-PF09 – R.M. of Minitonas-Bowsman

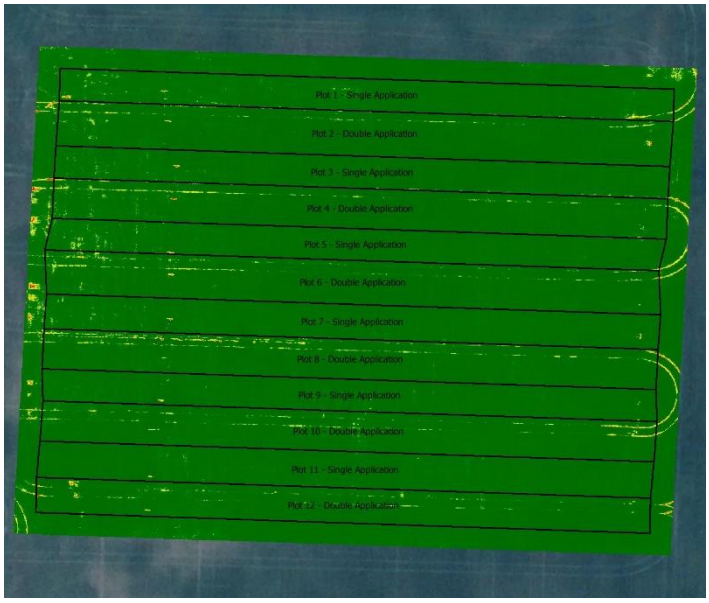
Objective: Quantify the agronomic and economic impacts of a single vs. double foliar fungicide application in field peas

Summary: Foliar ascochyta, stem ascochyta and white mould were prevalent throughout the trial. Rainfall in July was greater than normal, contributing to disease development. There was a significant yield increase of 7.2 bu/ac for peas with a double application of foliar fungicide compared to peas with a single application. This yield increase was more than enough to pay for the increased cost/ac of fungicide with the double application.

Trial Information

Treatment	Headline / Cotegra
Application Timing	Early Flower
Application Date	July 6 / July 15
Application Rate	161 ml/ac / 280 ml/ac
Application Method	Broadcast
Soil Texture	Very Fine Sandy Loam
Previous Crop	Wheat
Tillage	Conventional
Seeding Date	May 8
Variety	Inca
Seeding Rate	210 lbs/ac
Row Spacing	10”
Plant Stand @ R3	319 000 plants/ac
Harvest Date	August 20

NDVI Field Image July 29



Precipitation (mm)

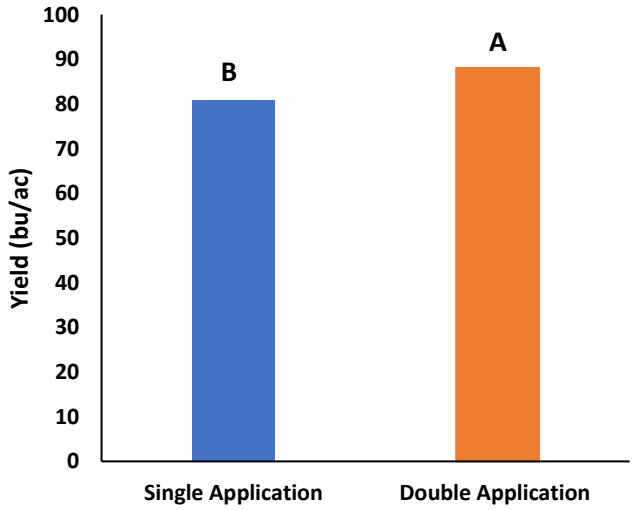
	May	June	July	August
Normal	45.4	84.2	85.6	68.3
Rainfall	12.1	62.9	122.8	43.4

Summary of Disease Rating (R3)ǂ

	Foliar Ascochtya		Stem Ascochyta		White Mould	
	SGL	DBL	SGL	DBL	SGL	DBL
Incidence	100%	100%	92%	52%	70%	48%
Severity	3.5	2.3	1.9	1.5	1.2	0.5

ǂ SGL=Single application, DBL=Double application; Foliar ascochyta 1 – 7 rating scale, stem ascochyta 1 – 7 rating scale, white mould 0 – 5 rating scale

Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac (@ pea price of $6 - $8/bu)ǂǂ
Double Application	88.1	$40/ac	+$23 to + $38/ac
Single Application	80.9	$20/ac	
Yield Difference	7.2		
P-value	0.0051		
CV	5.3%		
Significance	**Yes**	**Economic**	**No**

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines ($20/ac for single application); product cost only, does not include application cost

ǂ ǂ Change in profit is calculated as the difference between the change in income from the significant difference in yield and the difference in cost/ac

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Field Pea Nitrogen Fertility Trial

Objective: Quantify the agronomic impacts of nitrogen fertilizer rates in field peas.

Summary: There was no significant yield difference between N rates. Protein analysis is underway.

Table 8. Summary of 2020 field pea nitrogen fertility trial yield results by site-year.

Trial ID	Rural Municipality	Placement	Seeding Date	Yield			CV	P-Value	Statistically Significant @ 95%
				60 lb N/ac	30 lb N/ac	11 lb N/ac			
				bu/ac			%		
PN01	Pembina	in-furrow	May 7	75.8	74.3	75.2	3.4	0.7326	**No**

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Field Pea Nitrogen Fertility Trial

Trial ID: 2020_PN01 – R.M. of Pembina

Objective: Quantify the agronomic and economic impacts of nitrogen fertilizer rates in field peas

Summary: There was no significant yield difference between nitrogen fertilizer treatments. Protein analysis will be conducted to determine if the fertilizer treatments influenced pea protein content.

Trial Information

Treatment ǂ	11 vs 30 vs 60 lb N/ac
Rural Municipality	Pembina
Soil Texture	Clay Loam
Previous Crop	Canola
Tillage	Zero Till
Fall 2019 Soil N	8 lb/ac (0-8″)
Seeding Date	May 7
Variety	AAC Chrome
Seeding Rate	180 000 seeds/ac
Row Spacing	7.5″
Plant Stand @ V1	184 000 plants/ac
Harvest Date	August 20

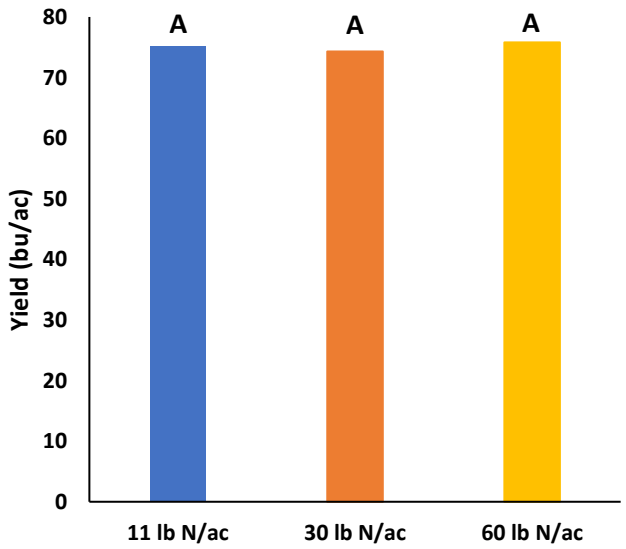
ǂ The 11 lb N/ac treatment is from the N contribution of an S15 application which is standard practice for this producer. The 30 and 60 lb N/ac treatments include ESN-N in addition to the S15-N contribution.

NDVI Field Image July 24

Precipitation (mm)

	May	June	July	August
Normal	58.6	90.8	73.3	63.6
Rainfall	39.1	53.1	80.7	18.7

Yield by Treatment



Nodulation ǂ

	Average Nodulation Rating @R2ǂ
11 lb N/ac	3.5
30 lb N/ac	3.5
60 lb N/ac	2.9

ǂ 0 = no nodules, 1 = Poor (<5/plant), 2 = Fair (<10/plant), 3 = Good (<20/plant), 4 = Excellent (>20/plant)

Soil Test N

Treatment	0-24″ Fall N (lb N/ac)
11 lb N/ac	20
30 lb N/ac	17
60 lb N/ac	18

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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac ǂǂ
11 lb N/ac	75.2		
30 lb N/ac	74.3	$19/ac	-$19/ac
60 lb N/ac	75.8	$38/ac	-$38/ac
P-Value	0.7326		
CV	3.4%		
Significance	**No**	**Economic**	**No**

ǂ Based on estimated ESN cost of $610/MT; 11 lb N/ac is contribution from S15 application which is standard practice for this producer, so there is no additional cost accounted for in this treatment

ǂ ǂ There was no significant difference in yield to offset the cost of ESN/ac

NOTES

Soybean Inoculant Trials – Double Inoculant vs. Single Inoculant

Objective: Quantify the agronomic and economic impacts of seed-applied inoculant (single inoculation) vs. seed-applied plus in-furrow inoculant (double inoculation) in soybeans. This trial requires a minimum field history of two previous soybean crops.

Summary: There was no significant yield difference between soybeans with double inoculant and soybeans with single inoculant. Nodulation ratings were similar between treatments for each trial.

Table 9. Summary of 2020 soybean double inoculant trial yield results by site-year.

Trial ID	Rural Municipality	Seeding Date	Nodule Rating @ R2 (0-4 scale)		Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
			Double	Single	Double	Single				
					bu/ac		bu/ac	%		
S2IN01	Dauphin	May 26	3.6	3.7	35.7	35.4	0.3	2.4	0.4776	**No**
S2IN02	Dauphin	May 26	2.8	2.8	34.4	33.7	0.7	3.0	0.3638	**No**
S2IN03	Louise	May 29	3.5	3.4	21.5	20.2	1.3	9.8	0.0867	**No**
S2IN04	Grassland	May 30	3.9	3.9	50.8	51.9	-1.1	3.0	0.3429	**No**

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Soybean Double Inoculant Trial

Trial ID: 2020-S12N01 – R.M. of Dauphin

Objective: Quantify the agronomic and economic impacts of seed applied inoculant (single inoculation) vs. seed applied plus in-furrow inoculant (double inoculation) in soybeans. This trial requires a minimum field history of 2 previous soybean crops.

Summary: Nodulation ratings were very similar between treatments. There was no significant yield difference between single and double inoculated soybeans. Due to the lack of yield response, there was a decrease in profit/ac equivalent to the cost difference between single and double inoculation.

Trial Information

Treatment	1x Optimize (liquid) 5 lbs/ac Cell-Tech (granular)
Last Soybean Crop	2016
Soybean History	2-year history
Soil Texture	Silty Loam
Previous Crop	Ryegrass
Tillage	Zero Till
Seeding Date	May 26
Variety	Amirani R2
Seeding Rate	223 000 seeds/ac
Row Spacing	10"
Plant Stand @ VC	153 000 plants/ac
Harvest Date	September 24

Precipitation (mm)

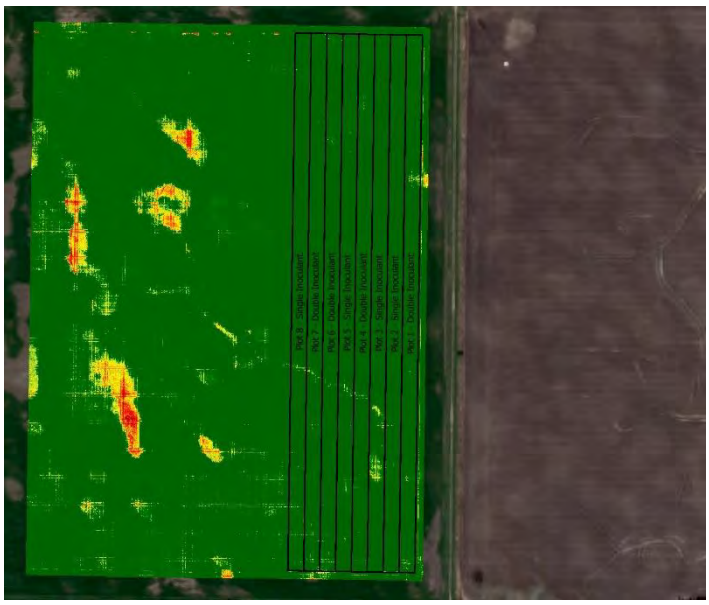
	May	June	July	August
Normal	54.3	86.7	73.2	63.3
Rainfall	31.8	101	67.9	98.4

Nodulation†

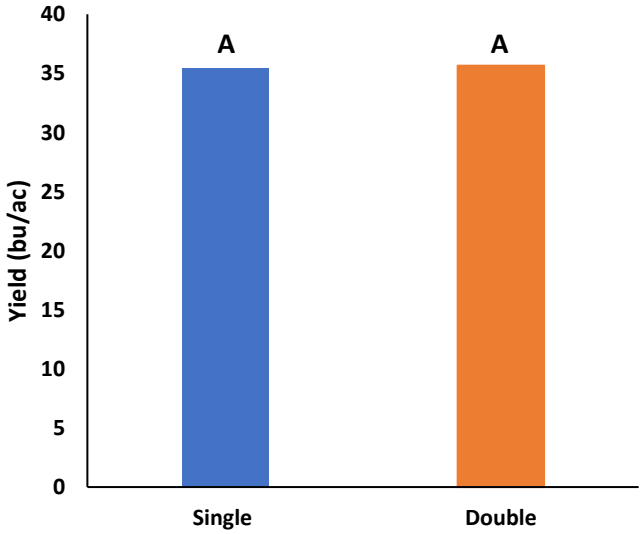
	Average Nodulation Rating @ R2
Double	3.6
Single	3.7

† 0 = no nodules, 1 = Poor (<5/plant), 2 = Fair (<10/plant), 3 = Good (<20/plant), 4 = Excellent (>20/plant)

NDVI Field Image August 14



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac ǂ ǂ
Double Inoculant	35.7	$15/ac	-$10/ac
Single Inoculant	35.4	$5/ac	
Yield Difference	0.3		
P-Value	0.4776		
CV	2.4%		
Significance	**No**	**Economic**	**No**

ǂ Based on an estimated cost for on-seed + granular in-furrow vs. on-seed only

ǂ ǂ Because yields were not significantly different, there is no increased income with the double inoculant to offset the increase in cost/ac

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Soybean Double Inoculant Trial

Trial ID: 2020-S2IN02 – R.M. of Dauphin

Objective: Quantify the agronomic and economic impacts of seed applied inoculant (single inoculation) vs. seed applied plus in-furrow inoculant (double inoculation) in soybean fields. This trial requires a minimum field history of 2 previous soybean crops.

Summary: Nodulation ratings were the same between treatments. There was no significant yield difference between single and double inoculated soybeans. Due to the lack of yield response, there was a decrease in profit/ac equivalent to the cost of the in-furrow inoculant application.

Trial Information

Treatment	1x Cell-Tech (liquid) 5 lbs/ac Nodulator (granular)
Last Soybean Crop	2017
Soybean History	2-year history
Soil Texture	Silty Loam
Previous Crop	Ryegrass
Tillage	Zero Till
Seeding Date	May 26
Variety	Amirani R2
Seeding Rate	223 000 seeds/ac
Row Spacing	10"
Plant Stand @ VC	180 000 plants/ac
Harvest Date	October 16

Precipitation (mm)

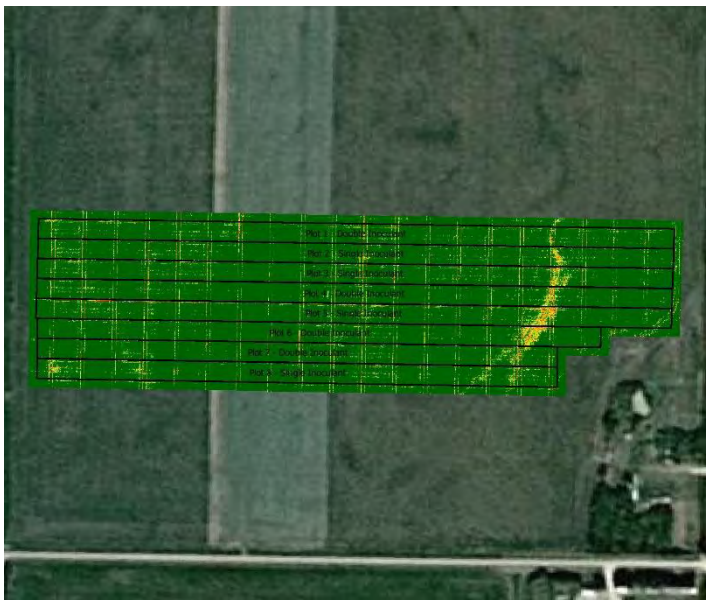
	May	June	July	August
Normal	54.3	86.7	73.2	63.3
Rainfall	27.8	102.6	67.9	98.4

Nodulation[ǂ]

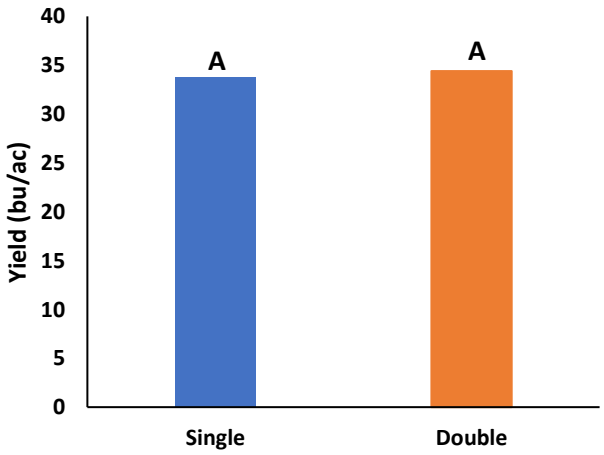
	Average Nodulation Rating @ R2
Double	2.8
Single	2.8

ǂ 0 = no nodules, 1 = Poor (<5/plant), 2 = Fair (<10/plant), 3 = Good (<20/plant), 4 = Excellent (>20/plant)

NDVI Field Image August 14



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Double Inoculant	34.4	$15/ac	-$10/ac
Single Inoculant	33.7	$5/ac	
Yield Difference	0.7		
P-Value	0.3638		
CV	3.0%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for on-seed + granular in-furrow vs. on-seed only

†† Because yields were not significantly different, there is no increased income with the double inoculant to offset the increase in cost/ac

Soybean Double Inoculant Trial

Trial ID: 2020-S2IN03 – R.M. of Louise

Objective: Quantify the agronomic and economic impacts of seed applied inoculant (single inoculation) vs. seed applied plus in-furrow inoculant (double inoculation) in soybean fields. This trial requires a minimum field history of 2 previous soybean crops.

Summary: Nodulation ratings were very similar between treatments. There was no significant yield difference between single and double inoculated soybeans. Due to the lack of yield response, there was a decrease in profit/ac equivalent to the cost of the in-furrow inoculant application.

Trial Information

Treatment	1x Optimize (liquid) 5 lbs/ac Cell-Tech (granular)
Last Soybean Crop	2017
Soybean History	3-year history
Soil Texture	Clay Loam
Previous Crop	Barley
Tillage	Zero Till
Seeding Date	May 29
Variety	S0009-M2
Seeding Rate	192 000 seeds/ac
Row Spacing	7.5"
Plant Stand @ V2	156 000 plants/ac
Harvest Date	September 24

Precipitation (mm)

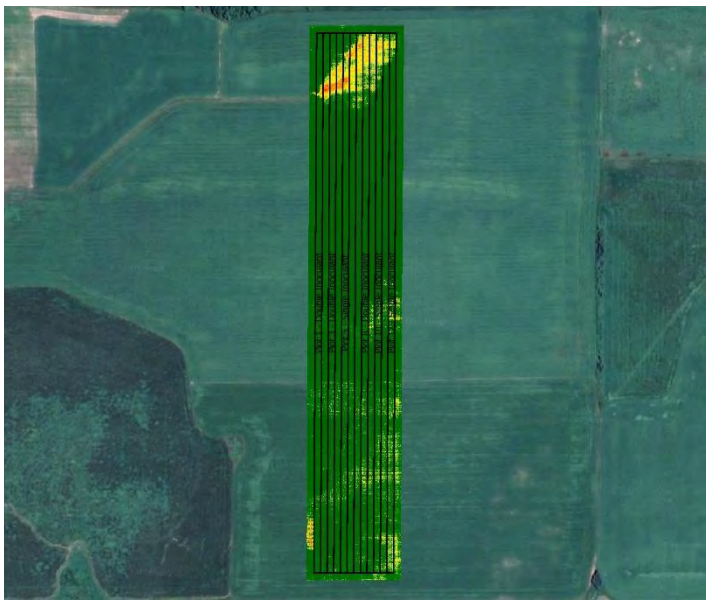
	May	June	July	August
Normal	61.1	89.8	68.3	72.3
Rainfall	46.4	107.9	102.8	30

Nodulation†

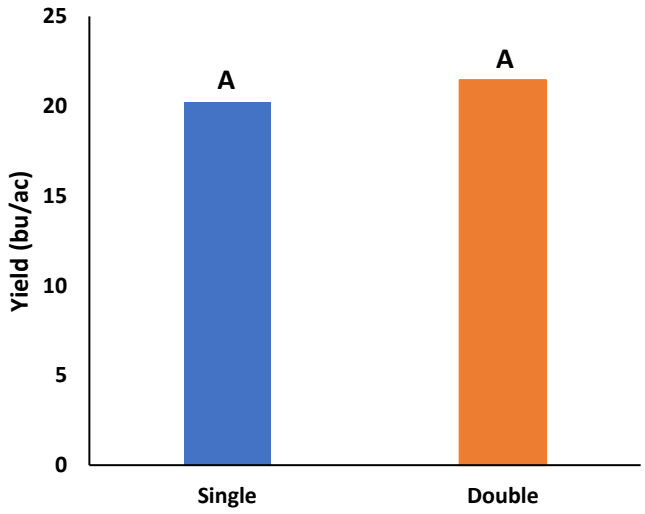
	Average nodulation rating @ R2
Double	3.5
Single	3.4

† 0 = no nodules, 1 = Poor (<5/plant), 2 = Fair (<10/plant), 3 = Good (<20/plant), 4 = Excellent (>20/plant)

NDVI Field Image August 15



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Double Inoculant	21.5	$15/ac	-$10/ac
Single Inoculant	20.2	$5/ac	
Yield Difference	1.3		
P-Value	0.0867		
CV	9.8%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for on-seed + granular in-furrow vs. on-seed only

†† Because yields were not significantly different, there is no increased income with the double inoculant to offset the increased cost/ac

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Soybean Double Inoculant Trial

Trial ID: 2020-S2IN04 – R.M. of Grassland

Objective: Quantify the agronomic and economic impacts of seed applied inoculant (single inoculation) vs. seed applied plus in-furrow inoculant (double inoculation) in soybean fields. This trial requires a minimum field history of 2 previous soybean crops.

Summary: Nodulation ratings were the same between treatments. There was no significant yield difference between single and double inoculated soybeans. Due to the lack of yield response, there was a decrease in profit/ac equivalent to the cost of the in-furrow inoculant application.

Trial Information

Treatment	1x Cell-Tech (liquid) 6 lbs/ac Cell-Tech (granular)
Last Soybean Crop	2018
Soybean History	2-year history
Soil Texture	Loam
Previous Crop	Wheat
Tillage	Zero Till
Seeding Date	May 30
Variety	Merritt R2X
Seeding Rate	181 000 seeds/ac
Row Spacing	12"
Plant Stand @ VC	161 000 plants/ac
Harvest Date	September 25

Precipitation (mm)

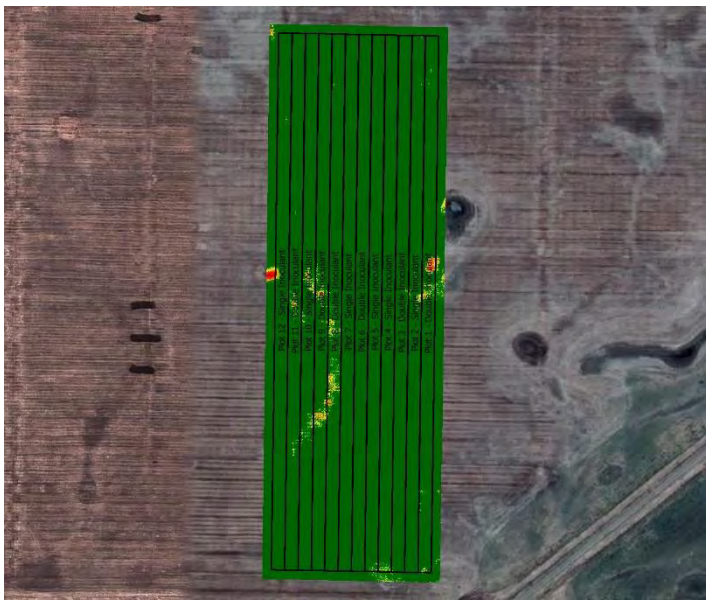
	May	June	July	August
Normal	46.9	83.7	65.2	57.6
Rainfall	19.2	199.3	51.1	23.9

Nodulation†

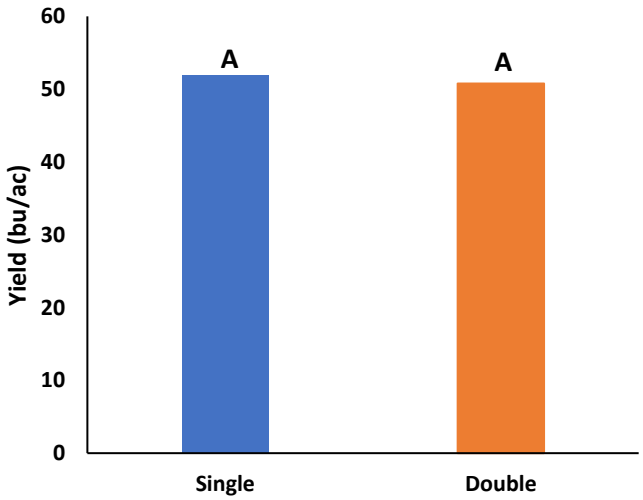
	Average nodulation rating @ R2
Double	3.9
Single	3.9

† 0 = no nodules, 1 = Poor (<5/plant), 2 = Fair (<10/plant), 3 = Good (<20/plant), 4 = Excellent (>20/plant)

NDVI Field Image August 21



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Double Inoculant	50.8	$15/ac	-$10/ac
Single Inoculant	51.9	$5/ac	
Yield Difference	-1.1		
P-Value	0.3429		
CV	3.0%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for on-seed + granular in-furrow vs. on-seed only

†† Because yields were not significantly different, there is no increased income with the double inoculant to offset the increase in cost/ac

NOTES

Soybean Inoculant Trials – Single Inoculant vs. No Inoculant

Objective: Quantify the agronomic impacts of seed-applied inoculant (single inoculation) vs. no inoculant applied in soybean fields. This trial requires a minimum field history of three previous soybean crops.

Summary: There was no significant yield difference for soybeans with and without single inoculant. Nodulation ratings were similar between the treatments for each trial.

**Note: S1IN01 only had a two-year soybean history*

Table 10. Summary of 2020 soybean single inoculant trial yield results by site-year.

Trial ID	Rural Municipality	Seeding Date	Nodule Rating @ R2 (0-4 Scale)		Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
			Inoculated	None	Inoculated	None				
					bu/ac		bu/ac	%		
S1IN01	De Salaberry	May 18	3.3	3.2	20.1	19.4	0.7	8.2	0.3642	**No**
S1IN03	Hanover	May 20	3.0	2.9	46.4	46.5	-0.1	1.4	0.7407	**No**
S1IN04	MacDonald	May 23	3.7	3.8	41.3	38.9	2.4	5.4	0.1550	**No**
S1IN05	Bifrost-Riverton	May 26	3.6	3.6	33.6	33.5	0.1	4.5	0.9526	**No**

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Soybean Single Inoculant Trial

Trial ID: 2020-S1IN01 – R.M. of De Salaberry

Objective: Quantify the agronomic impacts of seed applied inoculant (single inoculation) vs. no inoculant in soybean fields. This trial normally requires a minimum field history of three previous soybean crops; this field only has a 2-year soybean history.

Summary: Despite only have a 2-year soybean history, nodulation was very similar between treatments and there was no significant yield difference between soybeans with and without a single inoculant. Due to the lack of yield response, there was a decrease in profit/ac in the inoculated area of the trial, equivalent to the cost of the seed-applied inoculant.

Trial Information ǂ

Treatment	1x Optimize (liquid)
Last Soybean Crop	2016
Soybean History	2-year history
Soil Texture	Clay
Previous Crop	Oats
Tillage	Zero Till
Seeding Date	May 18
Variety	PS 0027 RR
Seeding Rate	411000
Row Spacing	10"
Plant Stand @ V1	98 000
Harvest Date	September 26

ǂ Does not meet soybean history requirement, will not be included in future overall analysis across years as a result

Precipitation (mm)

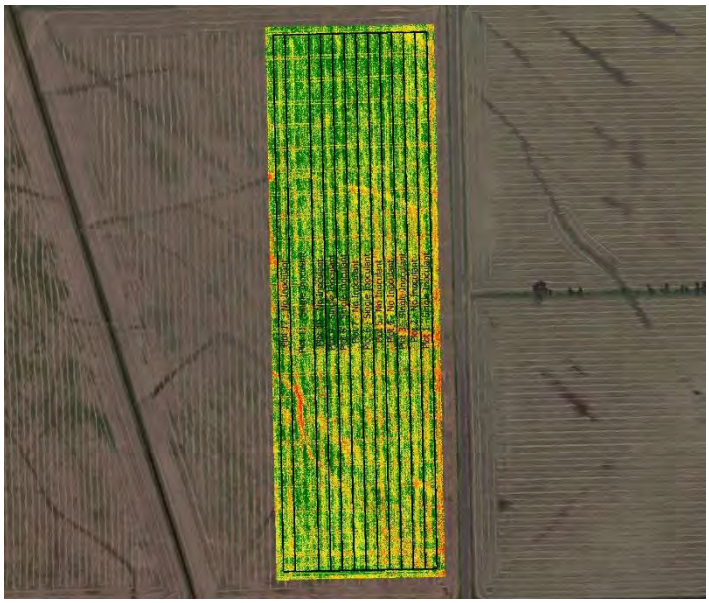
	May	June	July	August
Normal	52.6	94.7	69.5	51.7
Rainfall	14.3	113.5	93.7	68.4

Nodulation ǂ

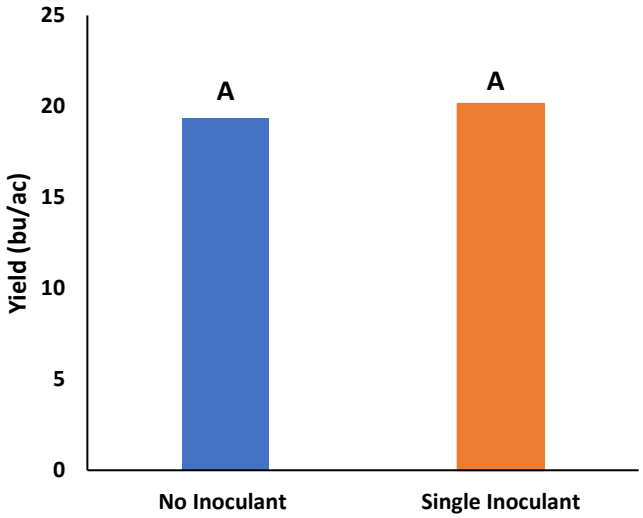
	Average nodulation rating @ R2
Single	3.3
None	3.2

ǂ 0 = no nodules, 1 = Poor (<5/plant), 2 = Fair (<10/plant), 3 = Good (<20/plant), 4 = Excellent (>20/plant)

NDVI Field Image August 19



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Single Inoculant	20.1	$5/ac	-$5/ac
Untreated	19.4		
Yield Difference	0.7		
P-Value	0.3642		
CV	8.2%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for on-seed inoculant

†† Because yields were not significantly different, there was no increased income to offset the cost of the single inoculant

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Soybean Single Inoculant Trial

Trial ID: 2020-S1IN03 – R.M. of Hanover

Objective: Quantify the agronomic and economic impacts of seed applied inoculant (single inoculation) vs. no inoculant applied in soybean fields. This trial requires a minimum field history of three previous soybean crops.

Summary: Nodulation was very similar between treatments. There was no significant yield difference between soybeans with and without single inoculant. Due to the lack of yield response, there was a decrease in profit/ac in the inoculated area of the trial equivalent to the cost of the seed-applied inoculant.

Trial Information

Treatment	1x Nodulator (liquid + peat)
Last Soybean Crop	2017
Soybean History	4-year history
Soil Texture	Clay Loam
Previous Crop	Canola
Tillage	Conventional
Seeding Date	May 20
Variety	25-10RY
Seeding Rate	210 000
Row Spacing	10"
Plant Stand @ V1	160 000
Harvest Date	September 28

Precipitation (mm)

	May	June	July	August
Normal	52.6	94.7	69.5	51.7
Rainfall	14.3	113.5	93.7	68.4

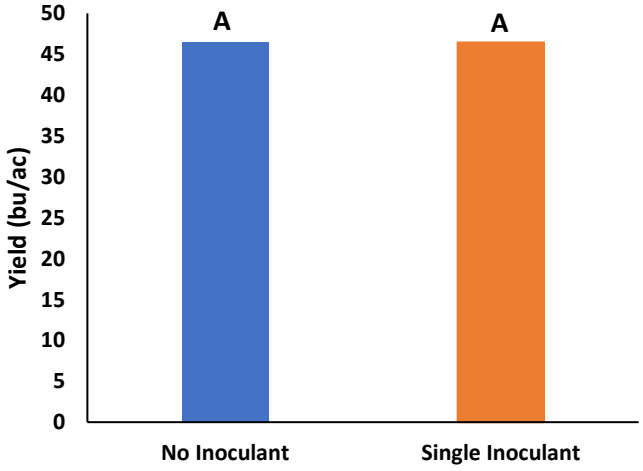
Nodulation†

	Average nodulation rating @ R2
Single	3.0
None	2.9

† 0 = no nodules, 1 = Poor (<5/plant), 2 = Fair (<10/plant), 3 = Good (<20/plant), 4 = Excellent (>20/plant)

NDVI Field Image August 19

Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Single Inoculant	46.4	$5/ac	-$5/ac
No Inoculant	46.5		
Yield Difference	-0.1		
P-Value	0.7407		
CV	1.4%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for on-seed inoculant

†† Because yields were not significantly different, there was no increased income to offset the cost of the single inoculant

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Soybean Single Inoculant Trial

Trial ID: 2020-S1IN04 – R.M. of MacDonald

Objective: Quantify the agronomic and economic impacts of seed applied inoculant (single inoculation) vs. no inoculant applied in soybean fields. This trial requires a minimum field history of three previous soybean crops.

Summary: Nodulation was very similar between treatments. There was no significant yield difference between soybeans with and without a single inoculant. Due to the lack of yield response, there was a decrease in profit/ac in the inoculated area of the trial equivalent to the cost of the seed-applied inoculant.

Trial Information ǂ

Treatment	BioRhiz (liquid) ½ rate & Nodulator (peat)
Last Soybean Crop	2016
Soybean History	3-year history
Soil Texture	Clay
Previous Crop	Wheat
Tillage	Zero Till
Seeding Date	May 23
Variety	LS Mistral
Seeding Rate	220 000
Row Spacing	15”
Plant Stand @ V1	130 000
Harvest Date	September 26

ǂ 1.5x inoculant rate trial, comparing 1.5x rate to no inoculant

Precipitation (mm)

	May	June	July	August
Normal	58.5	92	77.8	67.6
Rainfall	71	54.3	79	39.6

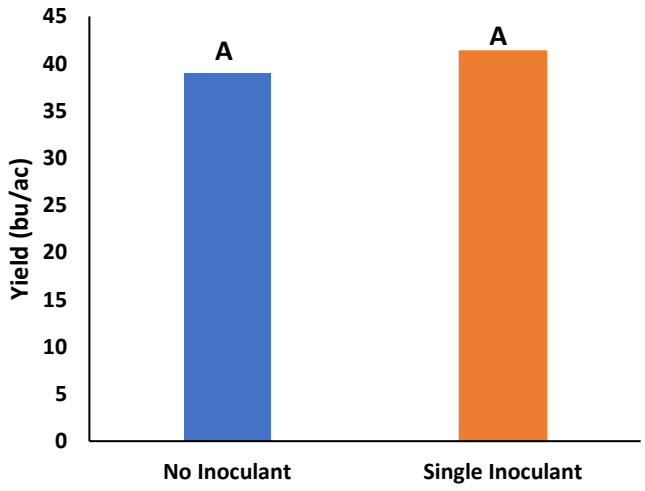
Nodulation ǂ

	Average nodulation rating @ R2
Single	3.7
None	3.8

ǂ 0 = no nodules, 1 = Poor (<5/plant), 2 = Fair (<10/plant), 3 = Good (<20/plant), 4 = Excellent (>20/plant)

NDVI Field Image August 20

Yield by Treatment



Additional On-Farm Network Research Reports

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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Single Inoculant	41.3	$5/ac	-$5/ac
No Inoculant	38.9		
Yield Difference	2.4		
P-Value	0.1550		
CV	5.4%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for on-seed inoculant

†† Because yields were not significantly different, there was no increased income to offset the cost of the single inoculant

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Soybean Single Inoculant Trial

Trial ID: 2020-S1IN05 – R.M. of Bifrost-Riverton

Objective: Quantify the agronomic and economic impacts of seed applied inoculant (single inoculation) vs. no inoculant applied in soybean fields. This trial requires a minimum field history of three previous soybean crops.

Summary: Nodulation was the same for both treatments. There was no significant yield difference between soybeans with and without a single inoculant. Due to the lack of yield response, there was a decrease in profit/ac in the inoculated area of the trial equivalent to the cost of the seed-applied inoculant.

Trial Information

Treatment	1x Nodulator (liquid)
Last Soybean Crop	2018
Soybean History	6-year history
Soil Texture	Clay
Previous Crop	Oats
Tillage	Conventional
Seeding Date	May 26
Variety	P003A97X
Seeding Rate	165 000
Row Spacing	20"
Plant Stand @ VC	136 000
Harvest Date	September 26

Precipitation (mm)

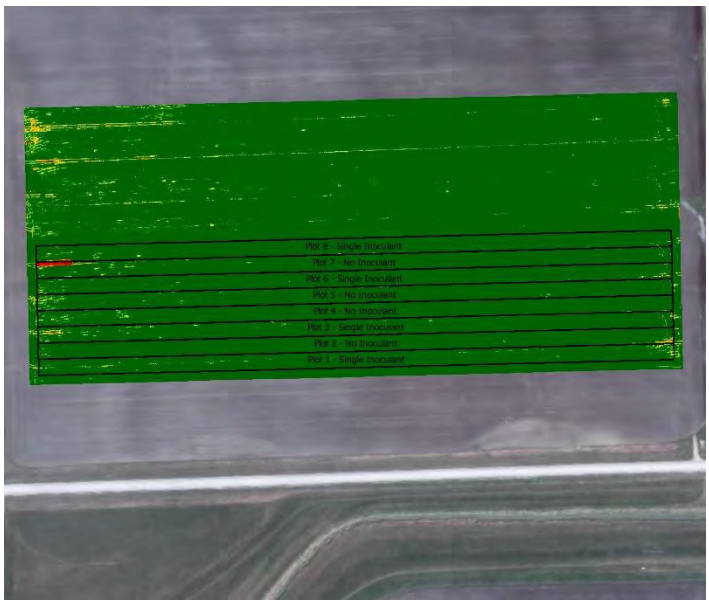
	May	June	July	August
Normal	44.7	75.6	69	79.7
Rainfall	12.1	83.5	61.2	33.5

Nodulation†

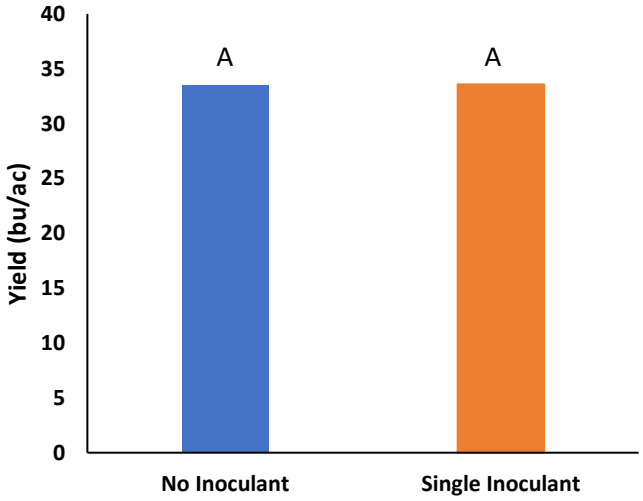
	Average nodules/plant @ R2
Single	3.6
None	3.6

† 0 = no nodules, 1 = Poor (<5/plant), 2 = Fair (<10/plant), 3 = Good (<20/plant), 4 = Excellent (>20/plant)

NDVI Field Image August 14



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Single Inoculant	33.6	$5/ac	-$5/ac
No Inoculant	33.5		
Yield Difference	0.1		
P-Value	0.9526		
CV	4.5%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for on-seed inoculant

†† Because yields were not significantly different, there was no increased income to offset the cost of the single inoculant

NOTES

Soybean Foliar Fungicide Trials

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in soybeans.

Summary: There was no significant yield difference between soybeans with and without a single application of foliar fungicide.

Table 11. Summary of 2020 soybean foliar fungicide trial yield results by site-year.

Trial ID	Rural Municipality	Product	Row Spacing	Plant Stand Midseason	Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
					Single App	Untreated				
			inch	'000/ac	bu/ac		bu/ac	%		
SF01	De Salaberry	Cotegra	15	127	38.1	35.6	2.5	17.1	0.3873	**No**
SF02	Ste. Anne	Cotegra	22	143	51.8	48.9	2.9	5.6	0.2776	**No**
SF03	Lorne	Acapela	10	146	33.9	33.9	0.0	4.4	0.9834	**No**
SF04	Brokenhead	Dyax	10	192	51.2	50.6	0.6	2.3	0.1335	**No**
SF05	Rockwood	Dyax	15	134	31.6	33.0	-1.4	6.5	0.2888	**No**
SF06	St. Andrews	Dyax	10	128	45.5	44.6	0.9	3.1	0.0966	**No**
SF07	Richot	Dyax	20	150	40.9	40.6	0.3	1.1	0.3598	**No**

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Soybean Fungicide Trial

Trial ID: 2020-SF01 – R.M. of De Salaberry

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in soybeans

Summary: Septoria brown spot was prevalent throughout the trial; frogeye leaf spot and Phytophthora root rot were also present. There was no significant yield difference between soybeans with and without an application of Cotegra. Due to the lack of yield response, there was a decrease in profit/ac in the treated area of the trial, equivalent to the cost of the fungicide application.

Trial Information

Treatment	Cotegra
Application Timing	R2
Application Date	July 9
Application Rate	280 ml/ac
Application Method	Broadcast
Soil Texture	Clay
Previous Crop	Corn
Tillage	Zero Till
Seeding Date	May 22
Variety	TH 87003 R2YX
Seeding Rate	167 500
Row Spacing	15”
Plant Stand @ R5	127 000 plants/ac
Harvest Date	September 20

Precipitation (mm)

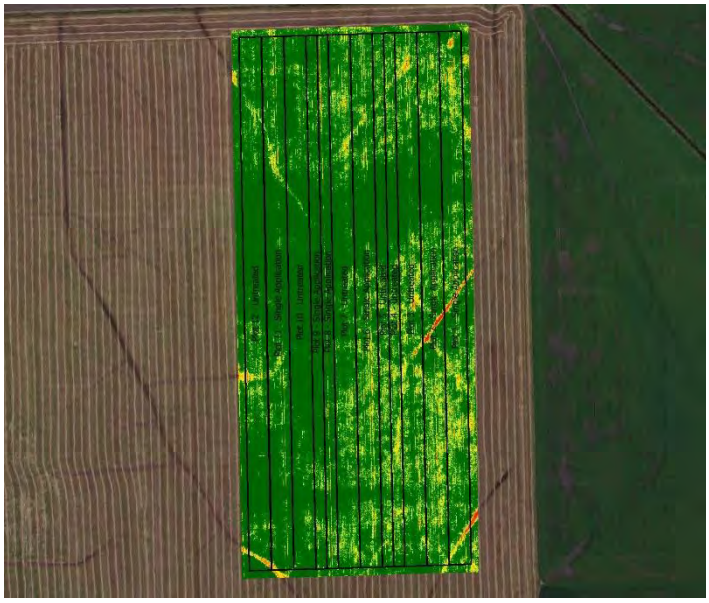
	May	June	July	August
Normal	52.6	94.7	69.5	51.7
Rainfall	14.3	113.5	93.7	68.4

Summary of Disease Rating (R4) ǂ

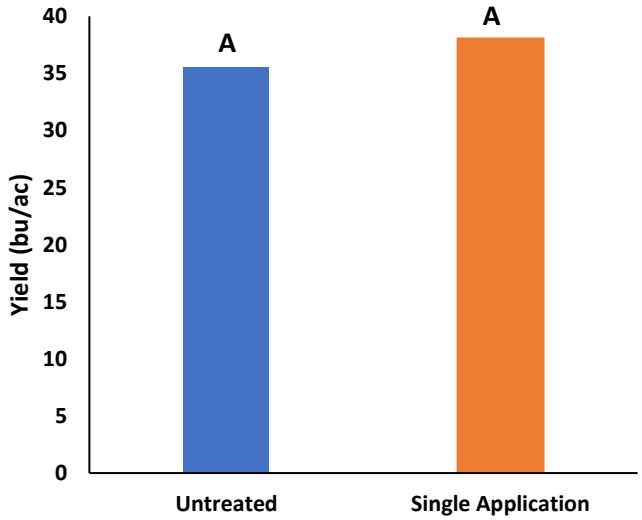
	Frogeye Leaf Spot		Septoria Brown Spot		Phytophthora Root Rot	
	UN	SGL	UN	SGL	UN	SGL
Incidence	22%	12%	92%	92%	23%	23%
Severity	n/a	n/a	1.76	1.69	n/a	n/a

ǂ SGL=Single application; Frogeye (presence/absence), septoria brown spot 0 – 5 rating scale, phytophthora (presence/absence); bacterial blight was present throughout the trial; downy mildew and anthracnose present at low levels

NDVI Field Image August 19



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Single Application	38.1	$15/ac	-$15/ac
Untreated	35.6		
Yield Difference	2.5		
P-Value	0.3873		
CV	17.1%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for a single application of soybean fungicide

†† Because yields were not significantly different, there was no increased income with fungicide application to offset the cost of the product

Soybean Fungicide Trial

Trial ID: 2020-SF02 – R.M. of Ste. Anne

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in soybeans

Summary: Septoria brown spot was prevalent throughout the trial; frogeye leaf spot and Phytophthora root rot were also present. There was no significant yield difference between soybeans with and without a single application of Cotegra. Due to the lack of yield response, there was a decrease in profit/ac in the treated area of the trial, equivalent to the cost of the fungicide application.

Trial Information

Treatment	Cotegra
Application Timing	R2
Application Date	July 10
Application Rate	280 ml/ac
Application Method	Broadcast
Soil Texture	Clay
Previous Crop	Oats
Tillage	Conventional
Seeding Date	May 20
Variety	NSC Richer RR2Y
Seeding Rate	170 000 seeds/ac
Row Spacing	22”
Plant Stand @ R4	143 000 plants/ac
Harvest Date	September 23

Precipitation (mm)

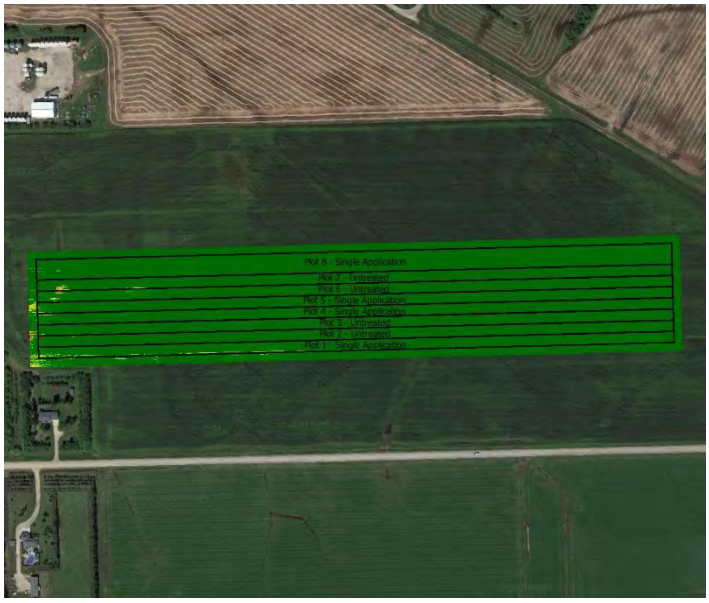
	May	June	July	August
Normal	58.1	91.3	80.1	66.1
Rainfall	14.2	60	91.5	81.7

Summary of Disease Rating (R4)ǂ

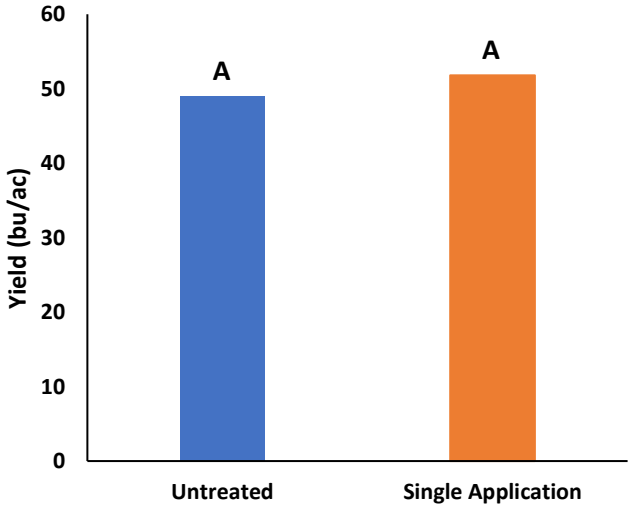
	Frogeye Leaf Spot		Septoria Brown Spot		Phytophthora Root Rot	
	UN	SGL	UN	SGL	UN	SGL
Incidence	0%	8%	100%	100%	3%	5%
Severity	n/a	n/a	1.95	1.78	n/a	n/a

ǂ SGL=Single application; Frogeye (presence/absence), septoria brown spot 0 – 5 rating scale, phytophthora (presence/absence); bacterial blight was present throughout the trial

NDVI Field Image August 17



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Single Application	51.8	$15/ac	-$15/ac
Untreated	48.9		
Yield Difference	2.9		
P-Value	0.2776		
CV	5.6%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for a single application of soybean fungicide

†† Because yields were not significantly different, there was no increased income with fungicide application to offset the cost of the product

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Soybean Fungicide Trial

Trial ID: 2020-SF03 – R.M. of Lorne

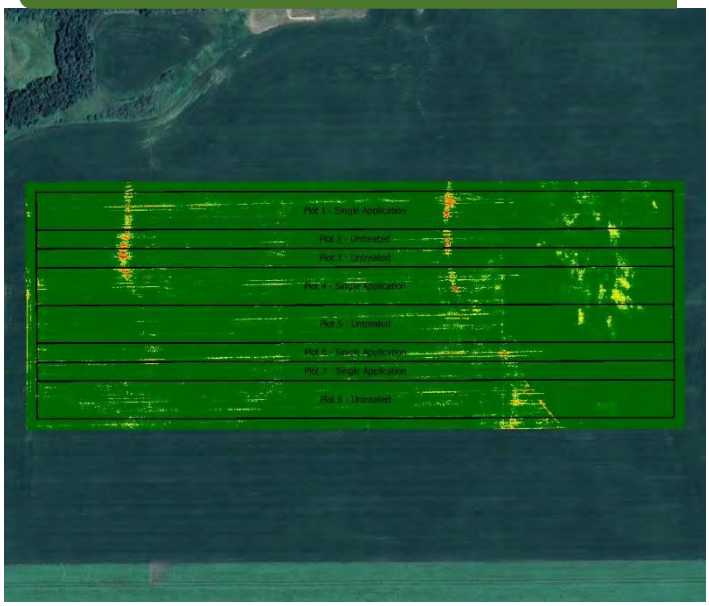
Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in soybeans

Summary: Septoria brown spot was prevalent throughout the trial. There was no significant yield difference between soybeans with and without a single application of Acapela. Due to the lack of yield response, there was a decrease in profit/ac in the treated area of the trial, equivalent to the cost of the fungicide application.

Trial Information

Treatment	Acapela
Application Timing	R2
Application Date	July 15
Application Rate	350 ml/ac
Application Method	Broadcast
Soil Texture	Clay Loam
Previous Crop	Wheat
Tillage	Zero Till
Seeding Date	May 23
Variety	S007-Y4
Seeding Rate	195 000 seeds/ac
Row Spacing	10”
Plant Stand @ R3	146 000 plants/ac
Harvest Date	September 28

NDVI Field Image August 21



Precipitation (mm)

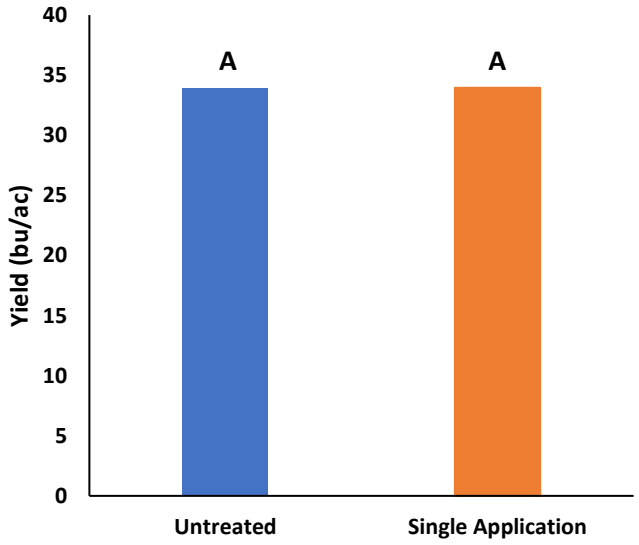
	May	June	July	August
Normal	58.6	90.8	73.3	62.8
Rainfall	23.6	61.7	76.1	44.5

Summary of Disease Rating (R4)ǂ

	Frogeye Leaf Spot		Septoria Brown Spot		White Mould	
	UN	SGL	UN	SGL	UN	SGL
Incidence	0%	0%	95%	100%	0%	0%
Severity	n/a	n/a	1.15	1.25	0.0	0.0

ǂ SGL=Single application; Frogeye (presence/absence), septoria brown spot 0 – 5 rating scale, white mould 0 – 3 rating scale; bacterial blight was present throughout the trial

Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Single Application	33.9	$15/ac	-$15/ac
Untreated	33.9		
Yield Difference	0		
P-Value	0.9834		
CV	4.4%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for a single application of soybean fungicide

†† Because yields were not significantly different, there was no increased income with fungicide application to offset the cost of the product

Soybean Fungicide Trial

Trial ID: 2020-SF04 – R.M. of Brokenhead

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in soybeans.

Summary: Septoria brown spot was prevalent throughout the trial; frogeye leaf spot and downy mildew were also present. There was no significant yield difference between soybeans with and without a single application of Dyax. Due to the lack of yield response, there was a decrease in profit/ac in the treated area of the trial, equivalent to the cost of the fungicide application.

Trial Information

Treatment	Dyax
Application Timing	R2
Application Date	July 16
Application Rate	120 ml/ac
Application Method	Broadcast
Soil Texture	Clay Loam
Previous Crop	Wheat
Tillage	Conventional
Seeding Date	May 18
Variety	LS 0036RR
Seeding Rate	160 000 seeds/ac
Row Spacing	10”
Plant Stand @ R5	192 000 plants/ac
Harvest Date	September 25

Precipitation (mm)

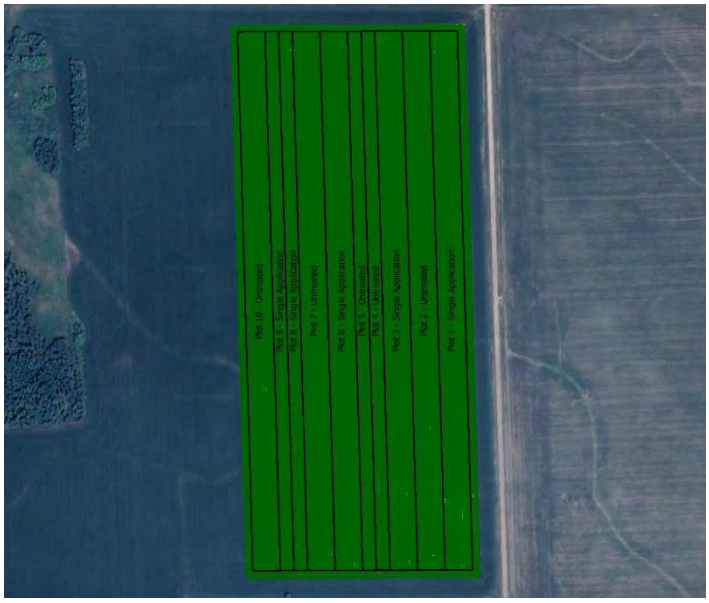
	May	June	July	August
Normal	54	89.9	73.4	72.6
Rainfall	11.3	74.9	49.8	110.7

Summary of Disease Rating (R4)ǂ

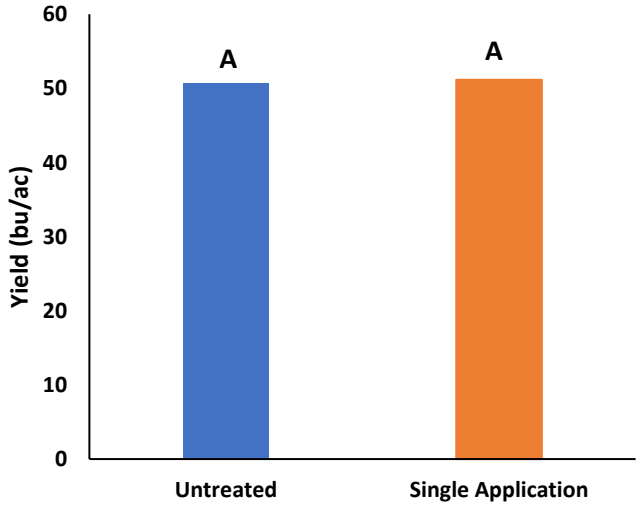
	Frogeye Leaf Spot		Septoria Brown Spot		Downy Mildew	
	UN	SGL	UN	SGL	UN	SGL
Incidence	10%	12%	100%	86%	24%	8%
Severity	n/a	n/a	1.88	1.34	n/a	n/a

ǂ SGL=Single application; Frogeye (presence/absence), septoria brown spot 0 – 5 rating scale, downy mildew (presence/absence); bacterial blight present throughout the trial

NDVI Field Image August 19



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Single Application	51.2	$15/ac	-$15/ac
Untreated	50.6		
Yield Difference	0.6		
P-Value	0.1335		
CV	2.3%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for a single application of soybean fungicide

†† Because yields were not significantly different, there was no increased income with fungicide application to offset the cost of the product

Soybean Fungicide Trial

Trial ID: 2020-SF05 – R.M. of Rockwood

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in soybeans

Summary: Septoria brown spot was prevalent throughout the trial. There was no significant yield difference between soybeans with and without a single application of Dyax. Due to the lack of yield response, there was a decrease in profit/ac in the treated area of the trial, equivalent to the cost of the fungicide application.

Trial Information

Treatment	Dyax
Application Timing	R2
Application Date	July 16
Application Rate	160 ml/ac
Application Method	Broadcast
Soil Texture	Clay Loam / Loam
Previous Crop	Oats
Tillage	Conventional
Seeding Date	May 26
Variety	Sunna R2X
Seeding Rate	164 000 seeds/ac
Row Spacing	15”
Plant Stand @ R5	134 000 plants/ac
Harvest Date	September 22

Precipitation (mm)

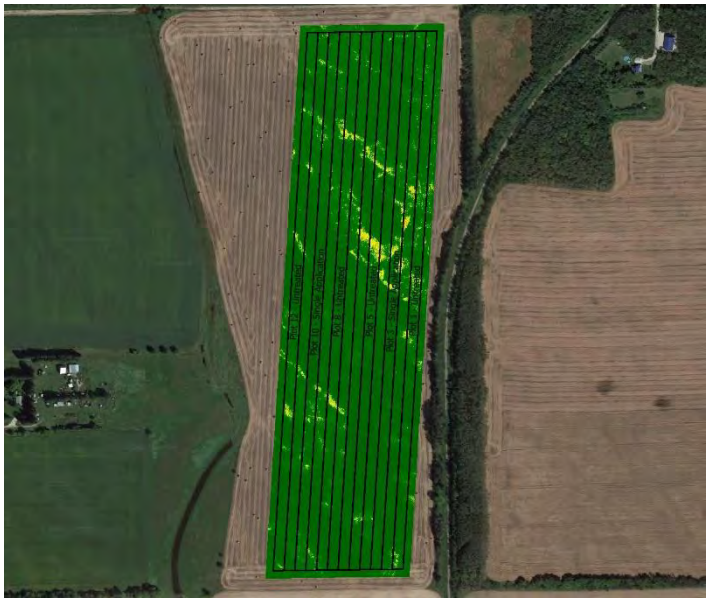
	May	June	July	August
Normal	53.8	92	66.4	63.3
Rainfall	11.4	60.4	40.5	79.5

Summary of Disease Rating (R4)ǂ

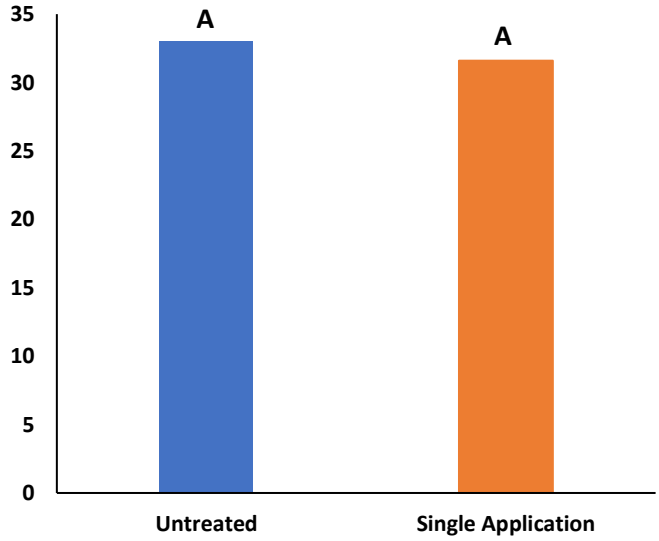
	Frogeye Leaf Spot		Septoria Brown Spot		White Mold	
	UN	SGL	UN	SGL	UN	SGL
Incidence	0%	0%	85%	82%	0%	0%
Severity	n/a	n/a	1.3	1.2	0.0	0.0

ǂ SGL=-Single application; Frogeye (presence/absence), Septoria Brown Spot 0 – 5 rating scale, White Mold 0 – 3 rating scale; bacterial blight present throughout the trial

NDVI Field Image August 20



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Single Application	31.6	$15/ac	-$15/ac
Untreated	33.0		
Yield Difference	-1.4		
P-Value	0.2888		
CV	6.5%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for a single application of soybean fungicide

†† Because yields were not significantly different, there was no increased income with fungicide application to offset the cost of the product

Soybean Fungicide Trial

Trial ID: 2020-SF06 – R.M. of St. Andrews

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in soybeans

Summary: Septoria brown spot was prevalent throughout the trial. There was no significant yield difference between soybeans with and without a single application of Dyax. Due to the lack of yield response, there was a decrease in profit/ac in the treated area of the trial, equivalent to the cost of the fungicide application.

Trial Information

Treatment	Dyax
Application Timing	R2
Application Date	July 17
Application Rate	160 ml/ac
Application Method	Broadcast
Soil Texture	Clay
Previous Crop	Wheat
Tillage	Zero Till
Seeding Date	May 22
Variety	24-10RY
Seeding Rate	190 000 seeds/ac
Row Spacing	10"
Plant Stand @ R5	128 000 plants/ac
Harvest Date	September 26

Precipitation (mm)

	May	June	July	August
Normal	53.8	92	66.4	63.3
Rainfall	11.4	60.4	40.5	79.5

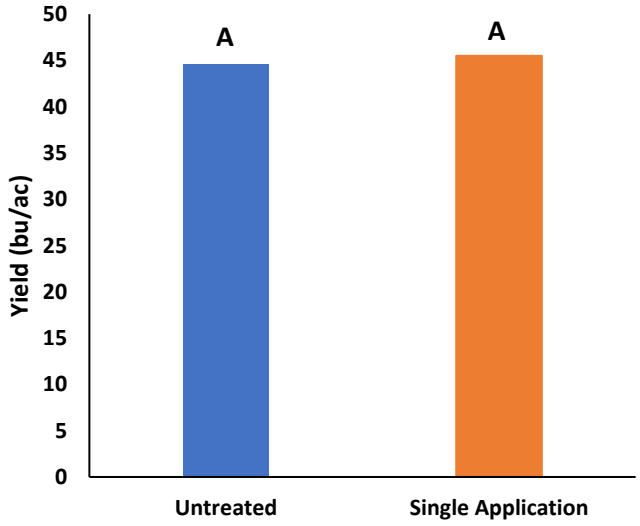
Summary of Disease Rating (R4)ǂ

	Frogeye Leaf Spot		Septoria Brown Spot		White Mould	
	UN	SGL	UN	SGL	UN	SGL
Incidence	0%	0%	78%	60%	0%	0%
Severity	n/a	n/a	1.04	0.76	0.0	0.0

ǂ SGL=Single application; Frogeye (presence/absence), septoria brown spot 0 – 5 rating scale, white mould 0 – 3 rating scale; bacterial blight present throughout the trial

NDVI Field Imageǂ

Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Single Application	45.5	$15/ac	-$15/ac
Untreated	44.6		
Yield Difference	0.9		
P-Value	0.0966		
CV	3.1%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for a single application of soybean fungicide

†† Because yields were not significantly different, there was no increased income with fungicide application to offset the cost of the product

Soybean Fungicide Trial

Trial ID: 2020-SF07 – R.M. of Richot

Objective: Quantify the agronomic and economic impacts of a single foliar fungicide application in soybeans

Summary: Septoria brown spot was prevalent throughout the trial; frogeye leaf spot and Phytophthora root rot were also present. There was no significant yield difference between soybeans with and without a single application of Dyax. Due to the lack of yield response, there was a decrease in profit/ac in the treated area of the trial, equivalent to the cost of the fungicide application.

Trial Information

Treatment	Dyax
Application Timing	R3
Application Date	July 20
Application Rate	160 ml/ac
Application Method	Broadcast
Soil Texture	Clay
Previous Crop	Wheat
Tillage	Conventional
Seeding Date	May 18
Variety	TH 88005R2XN
Seeding Rate	175 000 seeds/ac
Row Spacing	20”
Plant Stand @ R5	150 000 plants/ac
Harvest Date	September 22

Precipitation (mm)

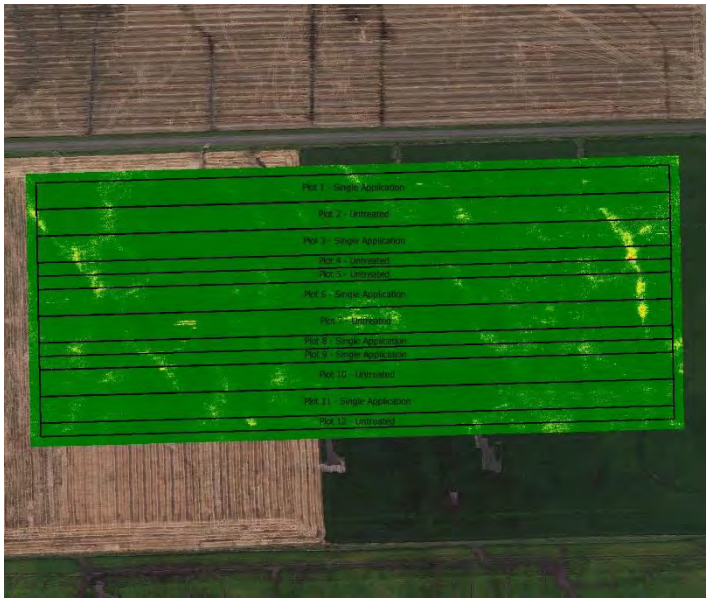
	May	June	July	August
Normal	52.6	88	69.5	75.8
Rainfall	14.3	49.4	43.9	88.7

Summary of Disease Rating (R4)ǂ

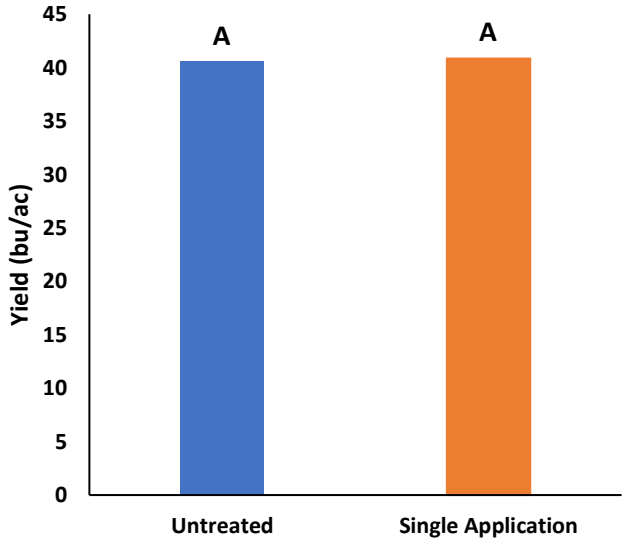
	Frogeye Leaf Spot		Septoria Brown Spot		Phytophthora Root Rot	
	UN	SGL	UN	SGL	UN	SGL
Incidence	12%	8%	92%	93%	22%	30%
Severity	n/a	n/a	2.09	2.11	n/a	n/a

ǂ SGL=Single application; Frogeye (presence/absence), septoria brown spot 0 – 5 rating scale, Phytophthora (presence/absence); bacterial blight present throughout the trial

NDVI Field Image August 19



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Single Application	40.9	$15/ac	-$15/ac
Untreated	40.6		
Yield Difference	0.3		
P-Value	0.3598		
CV	1.1%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for a single application of soybean fungicide

†† Because yields were not significantly different, there was no increased income with fungicide application to offset the cost of the product

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Soybean Seeding Rate Trials

Objective: Quantify the agronomic and economic impacts of different soybean seeding rates.

Summary: At one trial (SP07), the 130,000 seeds/ac rate significantly reduced yield compared to the 160,000 and 190,000 seeds/ac rates. At another trial (SP09), there was a significant yield increase for each increase in seeding rate from 120,000 to 150,000 to 180,000 seeds/ac. For all other seeding rate trials, there was no significant yield difference between treatments.

Table 12. Summary of 2020 soybean seeding rate trial yield results by site-year.

Trial ID	Rural Municipality	Seeding Date	Row Spacing	Plant Stand @ Midseason			Yield			CV	P-Value	Statistically Significant @ 95%
				185K	155K	125K	185K	155K	125K			
			inch	'000/ac			bu/ac			%		
SP01	Dauphin	May 17	10	153	140	111	47.4	47.3	48.6	4.4	0.3019	**No**

Trial ID	Rural Municipality	Seeding Date	Row Spacing	Plant Stand @ Midseason			Yield			CV	P-Value	Statistically Significant @ 95%
				190K	160K	130K	190K	160K	130K			
			inch	'000/ac			bu/ac			%		
SP02	Lac du Bonnet	May 18	7.5	141	126	116	34.5	32.8	29.5	7.7	0.103	**No**
SP04	Grey	May 19	30	164	140	119	36.7	37.2	38.2	2.7	0.097	**No**
SP05	Brokenhead	May 19	10	163	148	137	49.5	49.6	48.9	0.9	0.1322	**No**
SP07	Woodlands	May 23	10	168	129	119	48.8	48.7	46.7	2.2	0.0004	**Yes**
SP10	Morris	May 31	30	148	136	109	38	36.4	36.7	6	0.6343	**No**

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Soybean Seeding Rate Trials (continued)

Table 12 continued. Summary of 2020 soybean seeding rate trial yield results by site-year.

Trial ID	Rural Municipality	Seeding Date	Row Spacing	Plant Stand @ Midseason			Yield			CV	P-Value	Statistically Significant @ 95%
				180K	150K	120K	180K	150K	120K			
			inch	'000/ac			bu/ac			%		
SP03	Brokenhead	May 18	15	104	116	96	45	43.9	42.3	5.9	0.121	**No**
SP09	Morris	May 28	9	159	138	111	41.5	39.8	38.6	4.5	<0.0001	**Yes**

Trial ID	Rural Municipality	Seeding Date	Row Spacing	Plant Stand @ Midseason			Yield			CV	P-Value	Statistically Significant @ 95%
				160K	130K	100K	160K	130K	100K			
			inch	'000/ac			bu/ac			%		
SP06	Grey	May 21	20	123	91	84	35.5	36.9	32.9	9.4	0.2693	**No**

Trial ID	Rural Municipality	Seeding Date	Row Spacing	Plant Stand @ Midseason			Yield			CV	P-Value	Statistically Significant @ 95%
				210K	180K	150K	210K	180K	150K			
			inch	'000/ac			bu/ac			%		
SP08	St. Clements	May 21	10	178	164	149	47.8	46.7	45.8	3	0.1709	**No**

Trial ID	Rural Municipality	Seeding Date	Row Spacing	Plant Stand @ V1			Yield			CV	P-Value	Statistically Significant @ 95%
				226K	196K	166K	226K	196K	166K			
			inch	'000/ac			bu/ac			%		
SP11	Minitonas-Bowsman	May 19	10	161	124	123	40.2	39	38.3	4.8	0.1258	**No**

Soybean Seeding Rate Trial

Trial ID: 2020-SP01 – R.M. of Dauphin

Objective: Quantify the agronomic and economic impacts of different soybean seeding rates

Summary: There was no significant yield difference between seeding rates of 125,000, 155,000 and 185,000 seeds/ac. As a result, there was a decrease in profit equivalent to the increase in seed cost for the higher seeding rates.

Trial Information

Treatment	125k vs 155k vs 185k
Soil Texture	Clay
Previous Crop	Wheat
Tillage	Zero Till
Seeding Equipment	54 ft Air Drill
Seeding Date	May 17
Variety	P001A48X
Row Spacing	10”
Harvest Date	September 22

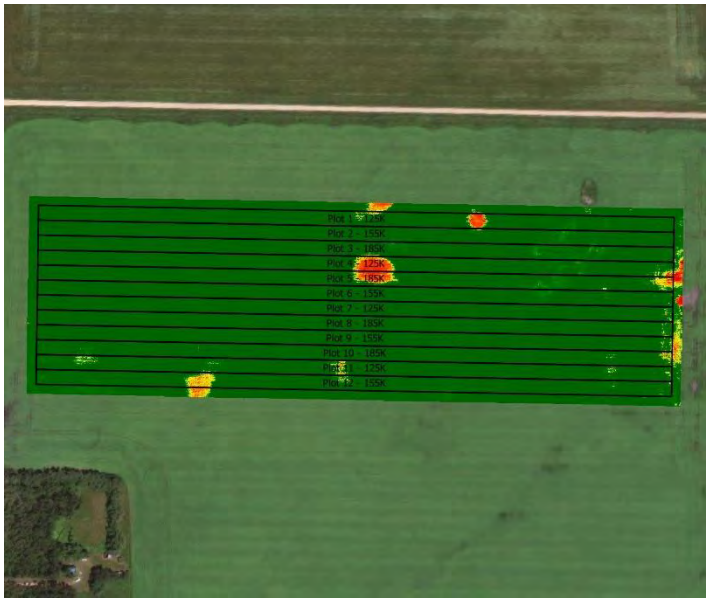
Precipitation (mm)

	May	June	July	August
Normal	54.3	86.7	73.2	63.3
Rainfall	31.8	101	67.9	98.4

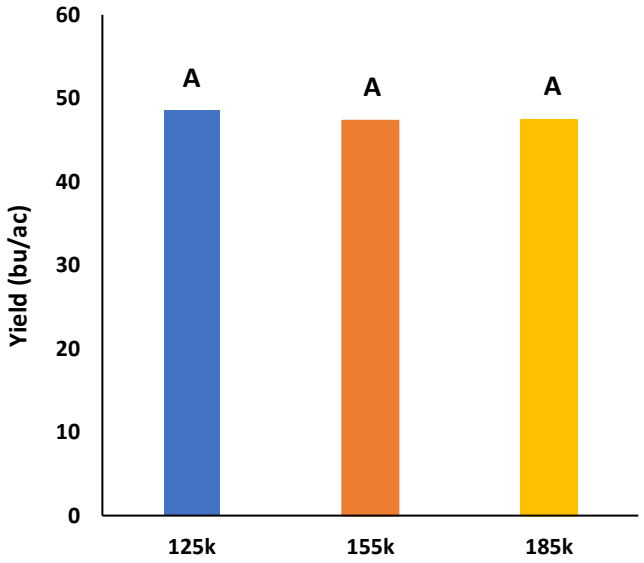
Plant Stand (plants/ac)

	V2	R7
125k	129 000	111 000
155k	134 000	140 000
185k	166 000	153 000

NDVI Field Image August 14



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac ǂ ǂ
125k	48.6	$59/ac	
155k	47.3	$73/ac	-$14/ac
185k	47.4	$88/ac	-$29/ac
P-Value	0.3019		
CV	4.4%		
Significance	**No**	**Economic**	125k → 155K No 125k → 185K No 155k → 185K No

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines ($66.50/unit)

ǂ ǂ Change in profit is calculated as the difference in cost between seeding rate treatments. Because yields were not significantly different, there is no increased income to offset the increase in seed cost

Soybean Seeding Rate Trial

Trial ID: 2020-SP02 – R.M. of Lac du Bonnet

Objective: Quantify the agronomic and economic impacts of different soybean seeding rates

Summary: There was no significant yield difference between seeding rates of 190,000, 160,000 and 130,000 seeds/ac. As a result, there was a decrease in profit equivalent to the increase in seed cost for the higher seeding rates.

Trial Information

Treatment	130k vs 160k vs 190k
Soil Texture	Clay
Previous Crop	Wheat
Tillage	Conventional
Seeding Equipment	60 ft Disc Drill
Seeding Date	May 18
Variety	LS 007XT
Row Spacing	7.5"
Harvest Date	October 3

Precipitation (mm)

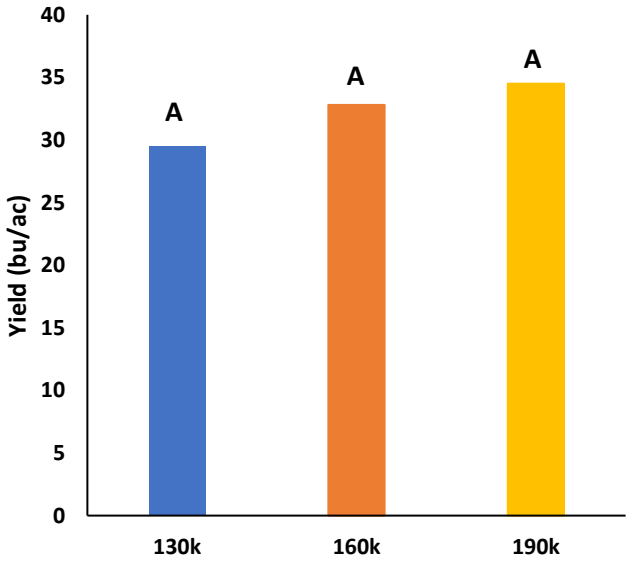
	May	June	July	August
Normal	58.2	92.6	77	69.9
Rainfall	16.3	97.9	69.7	141

Plant Stand (plants/ac)

	V2	R6
130k	121 000	116 000
160k	138 000	126 000
190k	153 000	141 000

NDVI Field Image August 19

Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac ǂ ǂ
130k	29.5	$62/ac	
160k	32.8	$76/ac	-$14
190k	34.5	$90/ac	-$28
P-Value	0.1030		
CV	7.7%		
Significance	**No**	**Economic**	130k → 160k No 130k → 190k No 160k → 190k No

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines ($66.50/unit)

ǂ ǂ Change in profit is calculated as the difference in cost between seeding rate treatments. Yields were not significantly different so there is no increased income to offset the increase in seed cost

Soybean Seeding Rate Trial

Trial ID: 2020-SP03 – R.M. of Brokenhead

Objective: Quantify the agronomic and economic impacts of different soybean seeding rates

Summary: There was no significant yield difference between seeding rates of 180,000, 150,000 and 120,000 seeds/ac. As a result, there was a decrease in profit equivalent to the increase in seed cost for the higher seeding rates.

Trial Information

Treatment	120k vs 150k vs 180k
Soil Texture	Clay Loam
Previous Crop	Wheat
Tillage	Conventional
Seeding Equipment	40 ft Planter
Seeding Date	May 18
Variety	P005A83X
Row Spacing	15”
Harvest Date	September 24

Precipitation (mm)

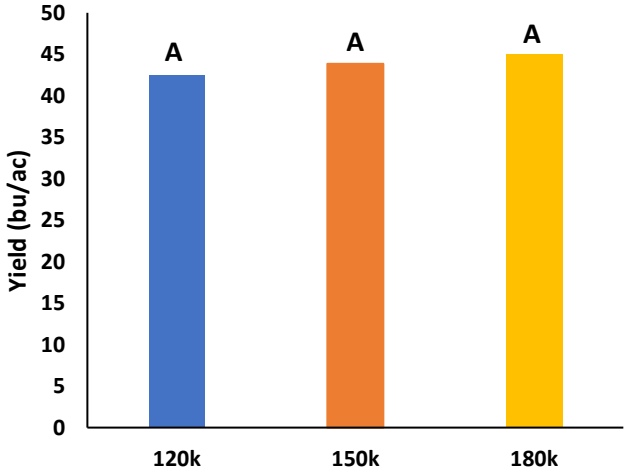
	May	June	July	August
Normal	54	89.9	73.4	72.6
Rainfall	11.3	74.9	49.8	110.7

Plant Stand (plants/ac)

	V2	R6
120k	101 000	96 000
150k	130 000	116 000
180k	110 000	104 000

NDVI Field Image August 19

Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profits/ac ǂ ǂ
120k	42.3	$59/ac	
150k	43.9	$71/ac	-$12/ac
180k	45.0	$86/ac	-$27/ac
P-Value	0.1210		
CV	5.9%		
Significance	**No**	**Economic**	120k → 150k No 120k → 180k No 150k → 180k No

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines ($66.50/unit)

ǂ ǂ Change in profit is calculated as the difference in cost between seeding rate treatments. Because yields were not significantly different, there is no increased income to offset the increase in seed cost

Soybean Seeding Rate Trial

Trial ID: 2020-SP04 – R.M. of Grey

Objective: Quantify the agronomic and economic impacts of different soybean seeding rates

Summary: There was no significant yield difference between seeding rates of 190,000, 160,000 and 130,000 seeds/ac. As a result, there was a decrease in profit equivalent to the increase in seed cost for the higher seeding rates.

Trial Information

Treatment	130k vs 160k vs 190k
Soil Texture	Clay
Previous Crop	Wheat
Tillage	Conventional
Seeding Equipment	60 ft Planter
Seeding Date	May 19
Variety	PS 0074 R2
Row Spacing	30”
Harvest Date	September 24

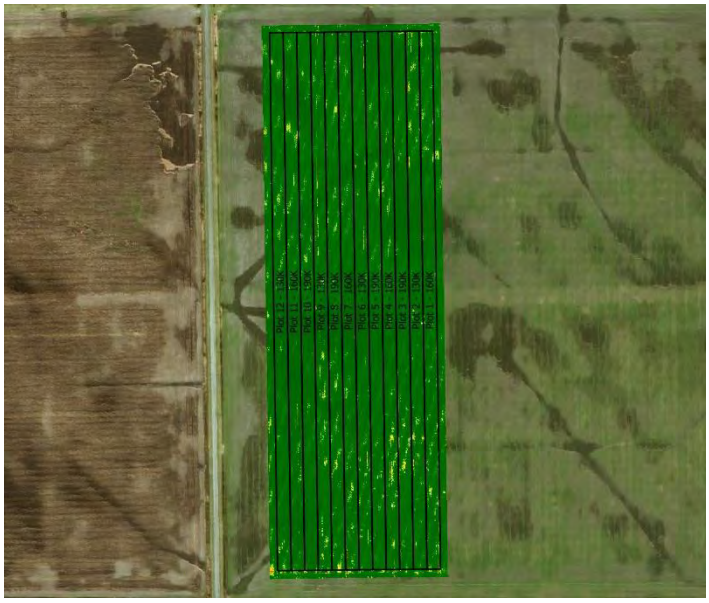
Precipitation (mm)

	May	June	July	August
Normal	53.8	80.6	65.7	71
Rainfall	28.3	52.6	49.5	39.4

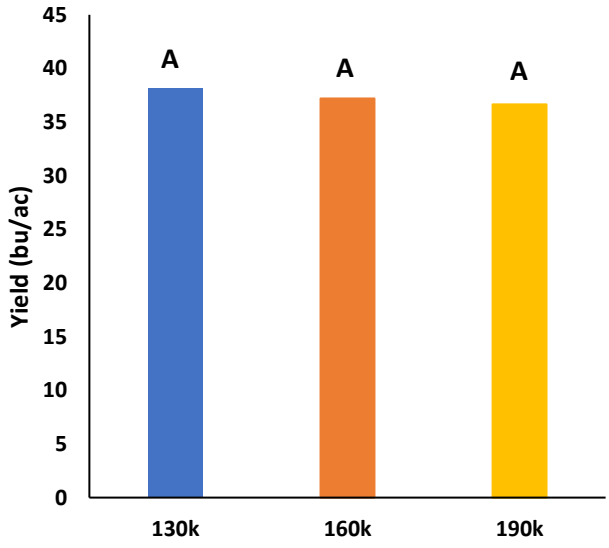
Plant Stand (plants/ac)

	V1	R6
130k	125 000	119 000
160k	148 000	140 000
190k	168 000	164 000

NDVI Field Image August 18



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac ǂ ǂ
130k	38.2	$62/ac	
160k	37.2	$76/ac	-$14/ac
190k	36.7	$90/ac	-$28/ac
P-Value	0.0970		
CV	2.7%		
Significance	**No**	**Economic**	130k → 160k No 130k → 190k No 160k → 190k No

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines ($66.50/unit)

ǂ ǂ Change in profit is calculated as the difference in cost between seeding rate treatments. Because yields were not significantly different, there is no increased income to offset the increase in seed cost

Soybean Seeding Rate Trial

Trial ID: 2020-SP05 – R.M. of Brokenhead

Objective: Quantify the agronomic impacts of a seeding rate of different soybean seeding rates

Summary: There was no significant yield difference between seeding rates of 190,000, 160,000 and 130,000 seeds/ac. As a result, there was a decrease in profit equivalent to the increase in seed cost for the higher seeding rates.

Trial Information

Treatment	130k vs 160k vs 190k
Soil Texture	Clay Loam
Previous Crop	Wheat
Tillage	Conventional
Seeding Equipment	60 ft Disc Drill
Seeding Date	May 19
Variety	LS 0036RR
Row Spacing	10”
Harvest Date	September 27

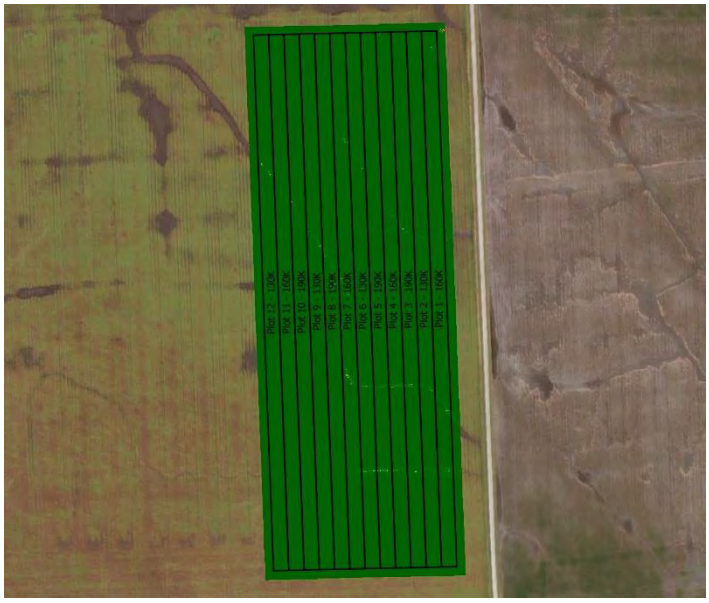
Precipitation (mm)

	May	June	July	August
Normal	54	89.9	73.4	72.6
Rainfall	11.3	74.9	49.8	110.7

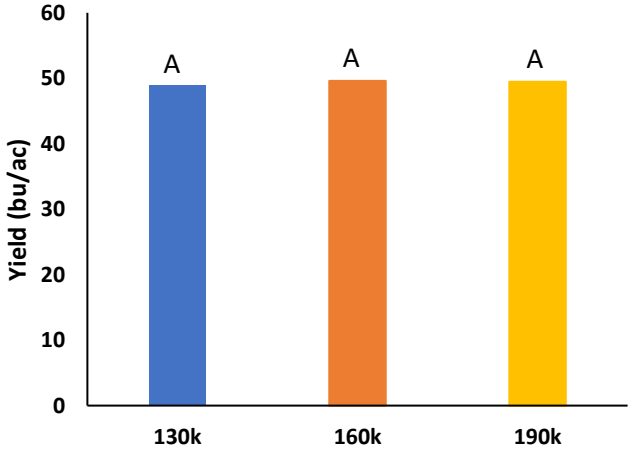
Plant Stand (plants/ac)

	V1	R8
130k	148 000	137 000
160k	170 000	148 000
190k	177 000	163 000

NDVI Field Image August 19



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac ǂ ǂ
130k	48.9	$62/ac	
160k	49.6	$76/ac	-$14/ac
190k	49.5	$90/ac	-$28/ac
P-Value	0.1322		
CV	0.9%		
Significance	**No**	**Economic**	130k → 160k No 130k → 190k No 160k → 190k No

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines ($66.50/unit)

ǂ ǂ Change in profit is calculated as the difference in cost between seeding rate treatments. Because yields were not significantly different, there is no increased income to offset the increase in seed cost

Soybean Seeding Rate Trial

Trial ID: 2020-SP06 – R.M. of Grey

Objective: Quantify the agronomic and economic impacts of a seeding rate of 160,000 seeds/ac, 130,000 seeds/ac and 100,000 seeds/ac

Summary: There was no significant yield difference between seeding rates of 160,000, 130,000 and 100,000 seeds/ac.

Trial Information

Treatment	100k vs 130k vs 160k
Soil Texture	Clay
Previous Crop	Wheat
Tillage	Conventional
Seeding Equipment	40 ft Planter
Seeding Date	May 21
Variety	24-10RY
Row Spacing	20”
Harvest Date	September 17

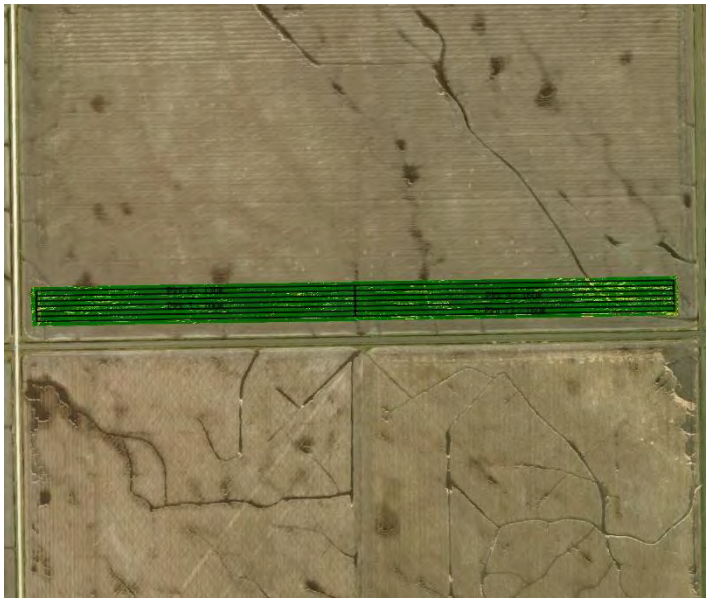
Precipitation (mm)

	May	June	July	August
Normal	53.8	80.6	65.7	71
Rainfall	28.3	52.6	49.5	39.4

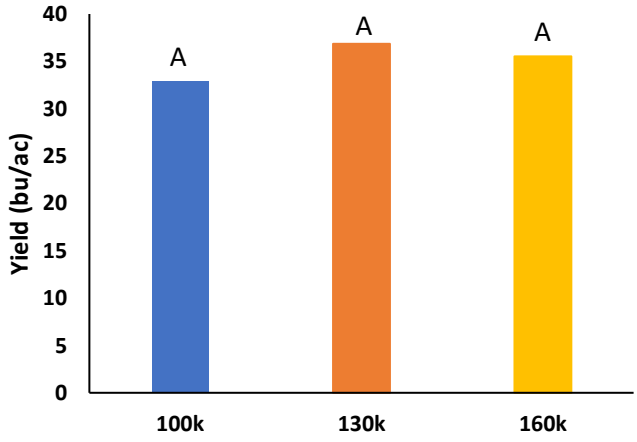
Plant Stand (plants/ac)

	V1	R6
100k	86 000	84 000
130k	111 000	91 000
160k	137 000	123 000

NDVI Field Image August 18



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Loss ††
100k	32.9	$48/ac	
130k	36.9	$62/ac	-$14/ac
160k	35.5	$76/ac	-$28/ac
P-Value	0.2693		
CV	9.4%		
Significance	**No**	**Economic**	100k → 130k No 100k → 160k No 130k → 190k No

[Additional On-Farm Network Research Reports]

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Soybean Seeding Rate Trial

Trial ID: 2020-SP07 – R.M. of Woodlands

Objective: Quantify the agronomic and economic impacts of different soybean seeding rates

Summary: The 130,000 seeds/ac treatment yielded significantly less than the 160,000 and 190,000 seeds/ac treatments. Increasing the seeding rate to 160,000 seeds/ac was economic, however, increasing the seeding rate to 190,000 seeds/ac was not economic.

Trial Information

Treatment	130K vs 160K vs 190K
Soil Texture	Clay
Previous Crop	Wheat
Tillage	Conventional
Seeding Equipment	40 ft Air Drill
Seeding Date	May 23
Variety	Merritt R2X
Row Spacing	10”
Harvest Date	September 23

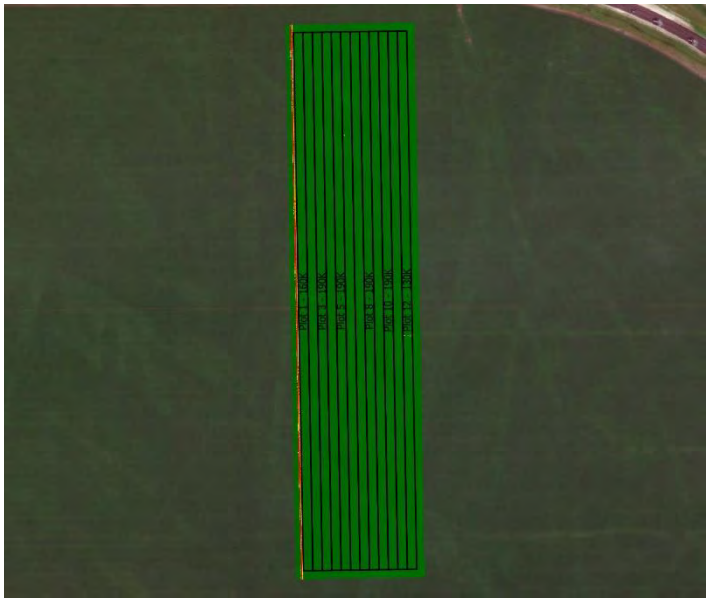
Precipitation (mm)

	May	June	July	August
Normal	53.8	92	66.4	63.3
Rainfall	36.2	51	47.1	91.5

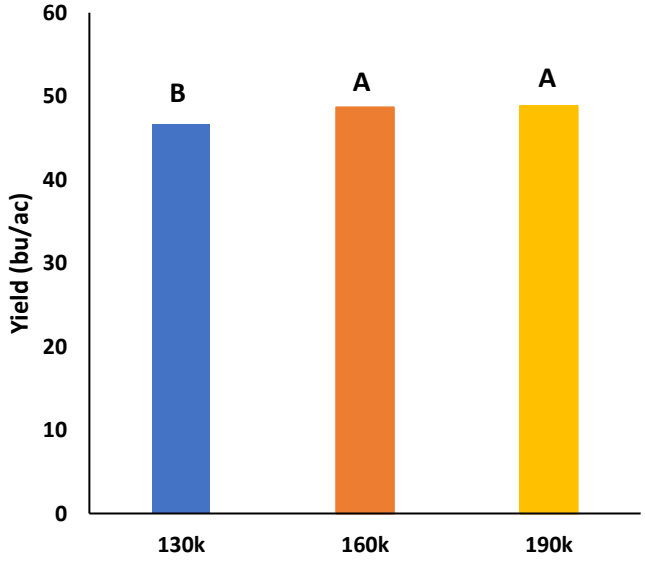
Plant Stand (plants/ac)

	V1	R6
130k	123 000	119 000
160k	141 000	129 000
190k	192 000	168 000

NDVI Field Image August 18



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac (@ soybean price of $10-$12/bu) ǂǂ
130k	46.7	$62/ac	
160k	48.7	$76/ac	130k → 160K: +$6 to +$10/ac
190k	48.8	$90/ac	130k → 190K: -$7 to -$3/ac
P-Value	0.0004		
CV	2.2%		
Significance	**Yes**	**Economic**	**130k → 160k Yes** 130k → 190k No 160k → 190k No

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines ($66.50/unit)

ǂ ǂ Change in profit is the difference between the change in income/ac, from a significant difference in yield, and the change in cost/ac with the change in seeding rate. Profit is presented as a range across soybean prices of $10/bu to $12/bu

Additional On-Farm Network Research Reports

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Soybean Seeding Rate Trial

Trial ID: 2020-SP08 – R.M. of St. Clements

Objective: Quantify the agronomic and economic impacts of different soybean seeding rates

Summary: There was no significant yield difference between seeding rates of 210,000, 180,000 and 150,000 seeds/ac. As a result, there was a decrease in profit equivalent to the increase in seed cost for the higher seeding rates.

Trial Information

Treatment	150k vs 180k vs 210k
Soil Texture	Clay
Previous Crop	Wheat
Tillage	Zero Till
Seeding Equipment	65 ft Air Drill
Seeding Date	May 21
Variety	S007-Y4
Row Spacing	10"
Harvest Date	September 25

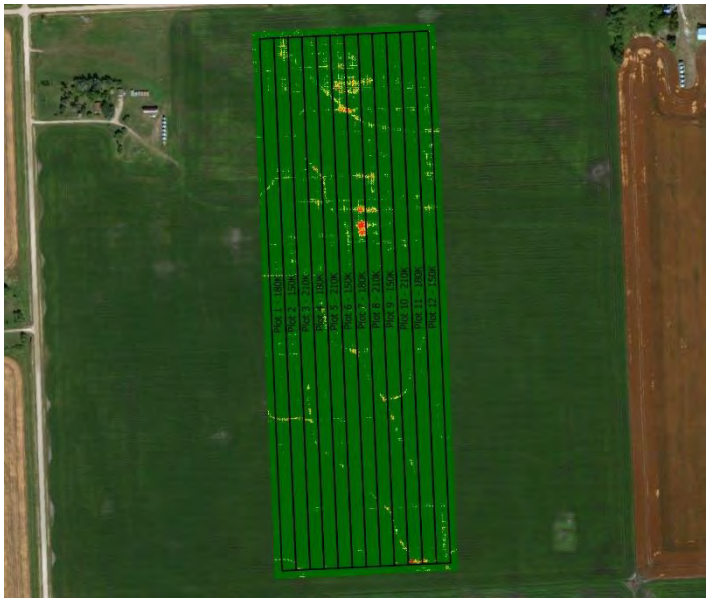
Precipitation (mm)

	May	June	July	August
Normal	54	89.9	73.4	72.6
Rainfall	11.3	74.9	49.8	110.7

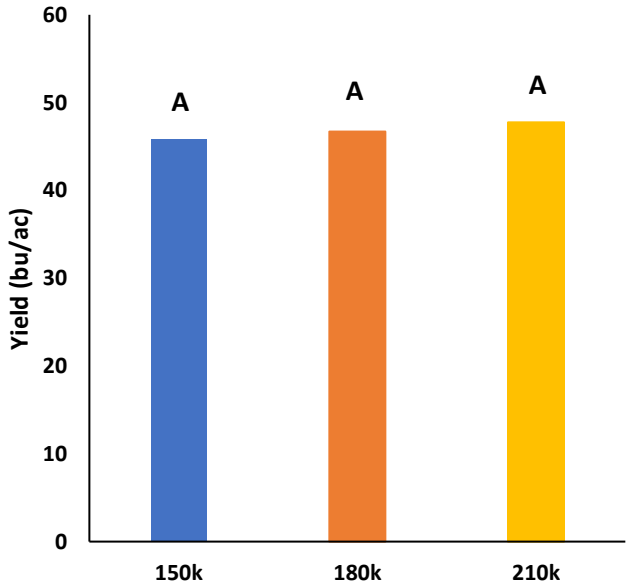
Plant Stand (plants/ac)

	V3	R6
150k	151 000	149 000
180k	173 000	164 000
210k	194 000	178 000

NDVI Field Image August 20



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac ǂ ǂ
150k	45.8	$71/ac	
180k	46.7	$86/ac	-$15/ac
210k	47.8	$100/ac	-$29/ac
P-Value	0.1709		
CV	3.0%		
Significance	**No**	**Economic**	150k → 180k No 150k → 210k No 180k → 210k No

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines ($66.50/unit)

ǂ ǂ Change in profit is calculated as the difference in cost between seeding rate treatments. Because yields were not significantly different, there is no increased income to offset the increase in seed cost

Soybean Seeding Rate Trial

Trial ID: 2020-SP09 – R.M. of Morris

Objective: Quantify the agronomic and economic impacts of different soybean seeding rates

Summary: There were significant yield differences between the three seeding rates at this trial. The 180,000 seeds/ac treatment yielded 1.7 bu/ac more than the 150,000 seeds/ac treatment and 2.9 bu/ac more than the 120,000 seeds/ac treatment. The 150,000 seeds/ac yield was also significantly different from the 120,000 seeds/ac yield, with an increase of 1.2 bu/ac. Increasing the seeding rate to 150,000 and 180,000 were both economic.

Trial Information

Treatment	120k vs 150k vs 180k
Soil Texture	Clay
Previous Crop	Wheat
Tillage	Conventional
Seeding Equipment	57.5 ft Air Drill
Seeding Date	May 28
Variety	PS 0068 XR
Row Spacing	9”
Harvest Date	September 26

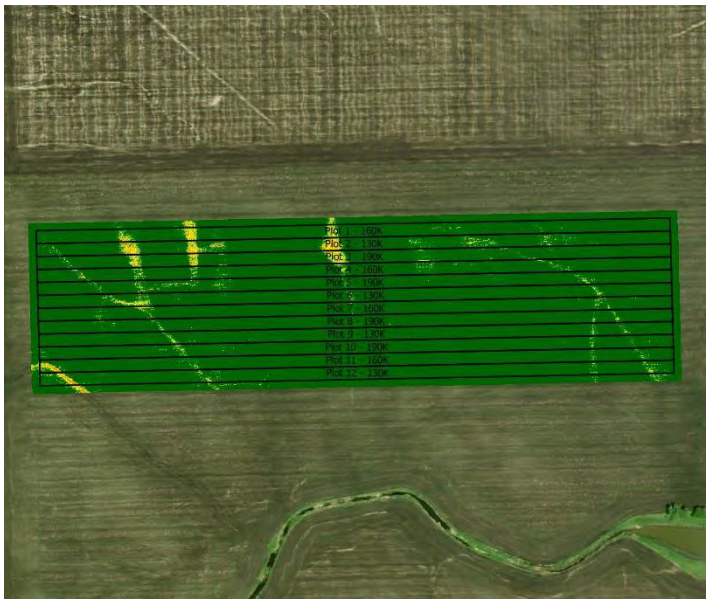
Precipitation (mm)

	May	June	July	August
Normal	53.6	86.4	71.9	65.4
Rainfall	9.9	96	82.6	117

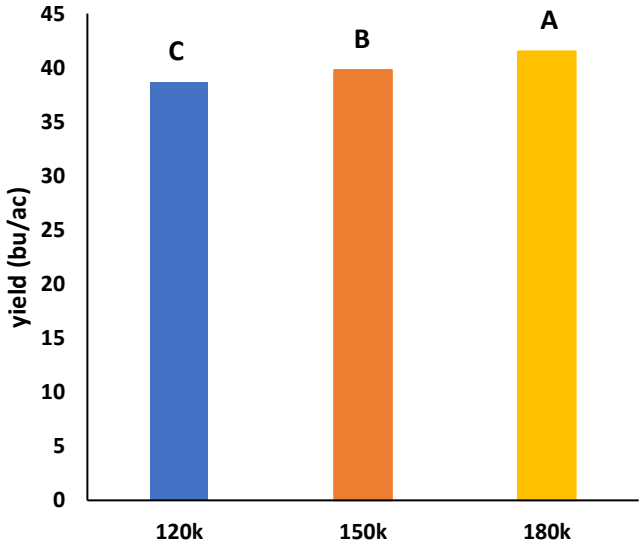
Plant Stand (plants/ac)

	V1	R6
120k	121 000	111 000
150k	147 000	138 000
180k	178 000	159 000

NDVI Field Image August 17



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit (@ soybean price of $10-$12/bu) ǂǂ
120k	38.6	$59/ac	
150k	39.8	$71/ac	120k → 150k: $0 to +$2/ac
180k	41.5	$86/ac	120k → 180k: $2 to +$8/ac 150k → 180k: $2 to +$5/ac
P-Value	<0.0001		
CV	4.5%		
Significance	**Yes**	**Economic**	**120k → 150k Yes** **120k → 180k Yes** **150k → 180k Yes**

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines ($66.50/unit)

ǂ ǂ Change in profit is the difference between the change in income/ac, from a significant difference in yield, and the change in cost/ac with the change in seeding rate. Profit is presented as a range across soybean prices of $10/bu to $12/bu

Soybean Seeding Rate Trial

Trial ID: 2020-SP10 – R.M. of Morris

Objective: Quantify the agronomic and economic impacts of different soybean seeding rates

Summary: There was no significant yield difference between seeding rates of 190,000 seeds/ac, 160,000 seeds/ac and 130,000 seeds/ac. As a result, there was a decrease in profit equivalent to the increase in seed cost for the higher seeding rates.

Trial Information

Treatment	130k vs 160k vs 190k
Soil Texture	Clay
Previous Crop	Canola
Tillage	Conventional
Seeding Equipment	90 ft Planter
Seeding Date	May 31
Variety	LS 007XT
Row Spacing	30"
Harvest Date	September 26

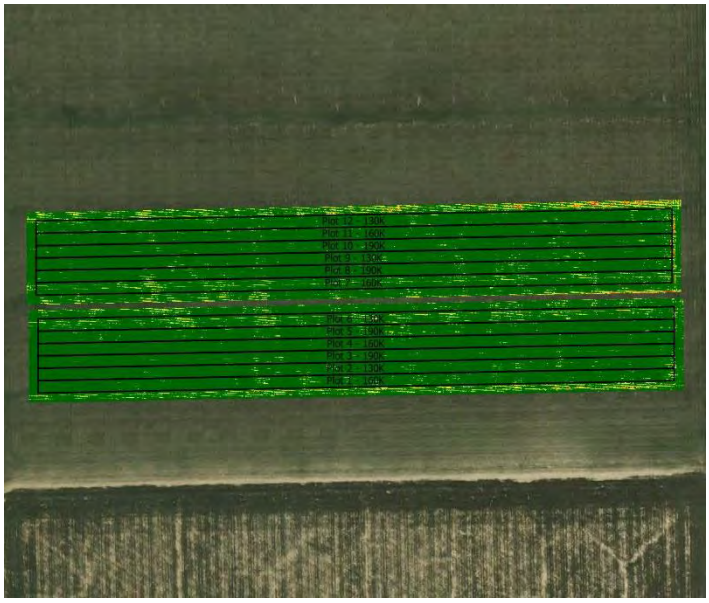
Precipitation (mm)

	May	June	July	August
Normal	53.6	86.4	71.9	65.4
Rainfall	9.9	96	82.6	117

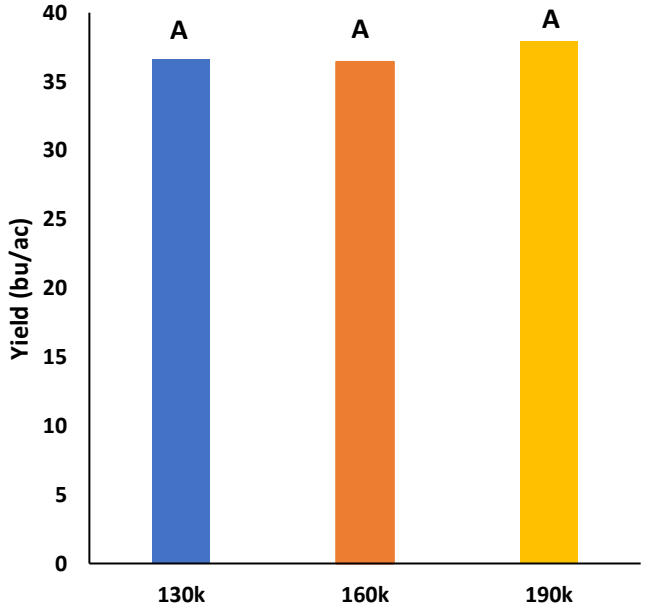
Plant Stand (plants/ac)

	V1	R6
130k	118 000	109 000
160k	143 000	136 000
190k	160 000	148 000

NDVI Field Image August 17



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in profit/ac ǂǂ
130k	36.7	$62/ac	
160k	36.4	$76/ac	-$14/ac
190k	38.0	$90/ac	-$28/ac
P-Value	0.6343		
CV	6.0%		
Significance	**No**	**Economic**	130k → 160k No 130k → 190k No 160k → 190k No

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines ($66.50/unit)

ǂ ǂ Change in profit is calculated as the difference in cost between seeding rate treatments. Because yields were not significantly different, there is no increased income to offset the increase in seed cost

Soybean Seeding Rate Trial

Trial ID: 2020-SP11 – R.M. of Minitonas-Bowsman

Objective: Quantify the agronomic and economic impacts of different soybean seeding rates

Summary: There was no significant yield difference between seeding rates of 226,000, 196,000 and 166,000 seeds/ac. As a result, there was a decrease in profit equivalent to the increase in seed cost for the higher seeding rates.

Trial Information

Treatment	166k vs 196k vs 226k
Soil Texture	Clay
Previous Crop	Canola
Tillage	Conventional
Seeding Equipment	Air Drill
Seeding Date	May 19
Variety	S0009-M2
Row Spacing	10″
Harvest Date	October 2

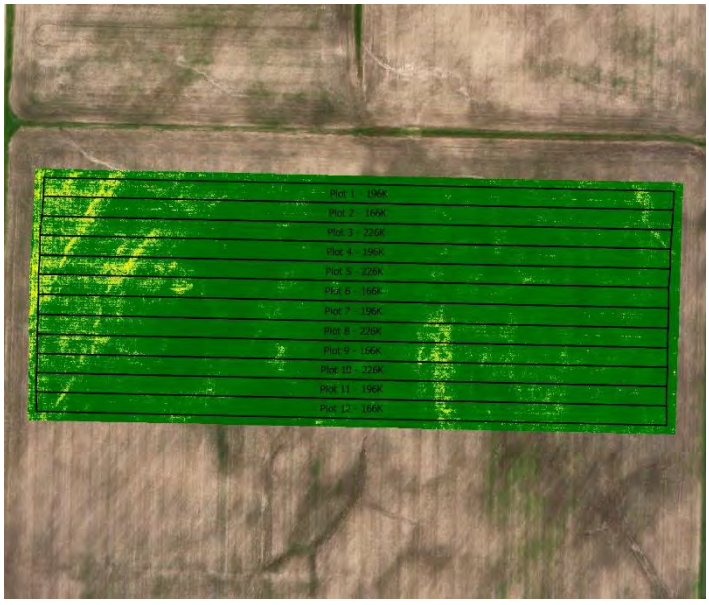
Precipitation (mm)

	May	June	July	August
Normal	45.4	84.2	85.6	68.3
Rainfall	12.1	62.9	122.8	43.4

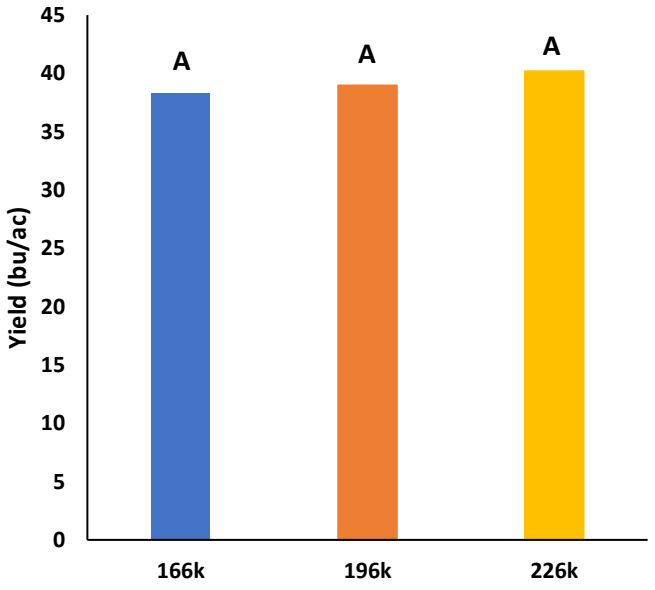
Plant Stand (plants/ac)

	V1
166k	123 000
196k	124 000
226k	161 000

NDVI Field Image August 26



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac ǂ ǂ
166k	38.3	$79/ac	
196k	39.0	$93/ac	-$14/ac
226k	40.2	$107/ac	-$28/ac
P-Value	0.1258		
CV	4.8%		
Significance	**No**	**Economic**	166k → 196k No 166k → 226k No 196k → 226k No

ǂ Based on MB Agriculture 2020 Cost of Production Guidelines ($66.50/unit)

ǂ ǂ Change in profit is calculated as the difference in cost between seeding rate treatments. Because yields were not significantly different, there is no increased income to offset the increase in seed cost

NOTES

Soybean Row Spacing Trials

Objective: Quantify the agronomic and economic impacts of different row spacings in soybeans.

Summary: Narrower row spacing significantly increased yield compared to wider row spacing at three of the five trials.

Table 13. Summary of 2020 soybean row spacing trial yield results by site-year.

Trial ID	Rural Municipality	Seeding Date	Seeding Rate	Plant Stand @ Midseason		Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
				10"	20"	10"	20"				
			'000/ac	'000/ac		bu/ac		bu/ac	%		
SRS02	Bifrost-Riverton	May 26	165	145	148	34.6	32.5	**2.1**	3.5	0.0073	**Yes**

Trial ID	Rural Municipality	Seeding Date	Seeding Rate	Plant Stand @ Midseason		Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
				7.5"	15"	7.5"	15"				
			'000/ac	'000/ac		bu/ac		bu/ac	%		
SRS04	Louise	May 29	191	136	138	25.8	23.4	**2.4**	8.7	0.0383	**Yes**

Trial ID	Rural Municipality	Seeding Date	Seeding Rate	Plant Stand @ Midseason		Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
				15"	30"	15"	30"				
			'000/ac	'000/ac		bu/ac		bu/ac	%		
SRS03	Rockwood	May 28	162	157	132	45.3	43.0	**2.3**	5.7	0.0280	**Yes**
SRS05	Grassland	May 29	170	142	136	40.1	40.6	-0.5	2.4	0.4197	**No**

Trial ID	Rural Municipality	Seeding Date	Seeding Rate	Plant Stand @ Midseason			Yield			CV	P-Value	Statistically Significant @ 95%
				15"	15" + high pop	30"	15"	15" + high pop	30"			
			'000/ac	'000/ac			bu/ac			%		
SRS01	Ste. Anne	May 22	160	137	138	123	48.1	46.9	45.5	3.6	0.1083	**No**

*Note: SRS01 compared 15", 15" plus higher plant population and 30" row spacing.

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Soybean Row Spacing Trial

Trial ID: 2020_SRS01 – R.M. of Ste. Anne

Objective: Quantify the agronomic and economic impacts of different row spacings on soybean production

Summary: There was no significant yield difference between 15" spacing, at regular or high population, and 30" spacing. As a result, profit decreased by the extra cost of seed for the high population treatment. Canopy closure was significantly greater in the 15" (high pop) treatment than the 30" treatment at R1 and R5. At R3, canopy closure was not significantly different between treatments.

Trial Information†

Treatment	15" vs 15" (high pop) vs 30"
Soil Texture	Clay
Previous Crop	Wheat
Tillage	Conventional
Seeding Equipment	40 ft Planter
Seeding Date	May 22
Variety	Astro R2
Seeding Rate	160 000 seeds/ac
Harvest Date	September 25

† Trial included a 15" high population treatment, with an additional 25,000 seeds/ac (i.e. seedings rate of high pop treatment was 185,000 seeds/ac)

Precipitation (mm)

	May	June	July	August
Normal	58.1	91.3	80.1	66.1
Rainfall	14.2	60	91.5	81.7

Plant Stand (plants/ac)

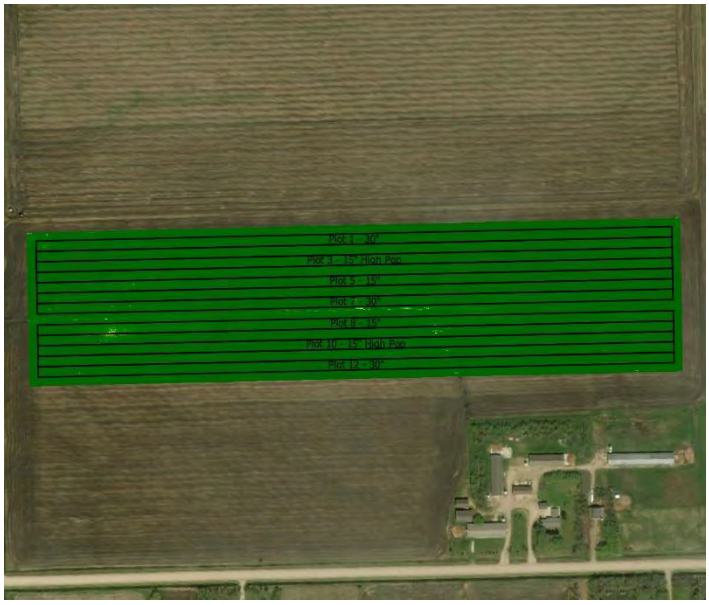
	V1	R7
15"	153,000	137,000
15" + High Pop	152,500	138,000
30"	132,500	123,000

% Canopy Closure†

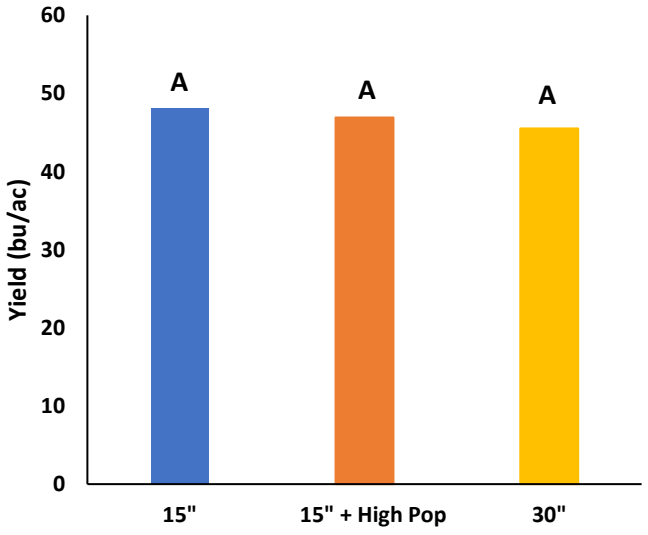
	R1	R3	R5
15"	57% AB	76% A	85% AB
15"+ High Pop	70% A	81% A	86% A
30"	53% B	73% A	79% B

† Closure percentages in columns followed by different letters are significantly different from one another.

NDVI Field Image August 17



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Change in Profit/ac ǂ	
15”	48.1		
15” @ high seed rate	46.9	-$12/ac	
30”	45.5		
P-Value	0.1083		
CV	3.6%		
Significance	**No**	**Economic**	**No**

ǂ Does not account for any equipment/operating cost differences between spacings; loss reflects difference in seed cost (from MB Agriculture Cost of Production ($66.50/unit)) between the standard 160,000 seeds/ac seeding rate and the 185,000 seeds/ac high seeding rate

Soybean Row Spacing Trial

Trial ID: 2020_SRS02 – R.M. of Bifrost-Riverton

Objective: Quantify the agronomic and economic impacts of different row spacings on soybean production

Summary: Yield significantly increased by 2.1 bu/ac with 10" row spacing compared to 20" spacing. The canopy began to close faster in the 10" row spacing strips, and closure was significantly greater at R1, R3 and R5 in the 10" spacing compared to the 20" spacing.

Trial Information

Treatment	10" vs 20"
Soil Texture	Clay
Previous Crop	Oats
Tillage	Conventional
Seeding Equipment	60 ft Planter
Seeding Date	May 26
Variety	P003A97X
Seeding Rate	165 000 seeds/ac
Harvest Date	September 26

Precipitation (mm)

	May	June	July	August
Normal	44.7	75.6	69	79.7
Rainfall	12.1	83.5	61.2	33.5

Plant Stand (plants/ac)ǂ

	VC	R7
10"	136,500	145,000
20"	140,500	147,500

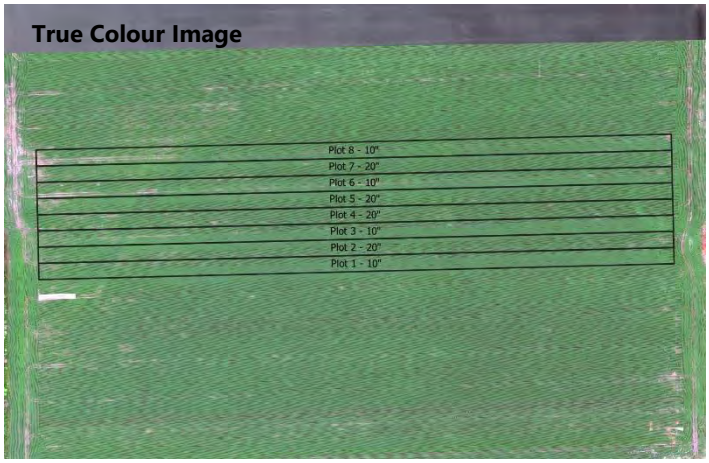
ǂ Emergence continued after early season plant counts at this site

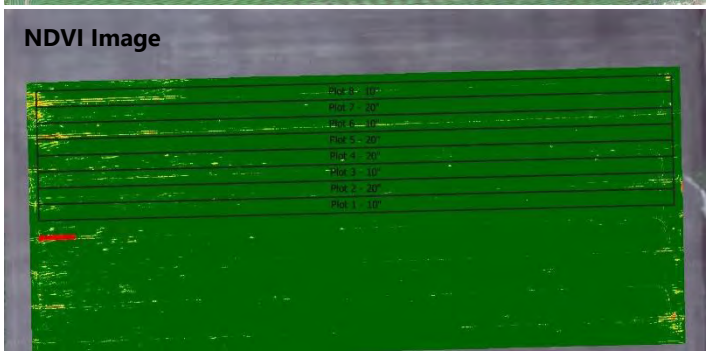
% Canopy Closureǂ

	R1	R3	R5
10"	85% A	89% A	89% A
20"	76% B	84% B	86% B

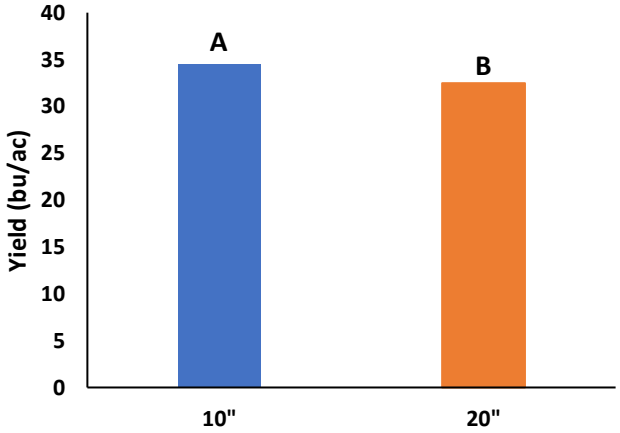
ǂ Closure percentages in columns followed by different letters are significantly different from one another

Field Images August 14





Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Change in Profit/ac (@ soybean price of $10 - $12/bu) ǂ
10”	34.6	+$21 to +$25/ac
20”	32.5	
Yield Difference	2.1	
P-Value	0.0073	
CV	3.5%	
Significance	**Yes**	**Economic** **Yes**

ǂ Does not account for any equipment/operating cost differences between spacings; profit reflects increase in income with the increase in yield for soybeans on 10” spacing compared to soybeans on 20” spacing

Soybean Row Spacing Trial

Trial ID: 2020_SRS03 – R.M. of Rockwood

Objective: Quantify the agronomic and economic impacts of different row spacings on soybean production

Summary: Yield significantly increased by 2.3 bu/ac with 15" row spacing compared to 30" spacing. Canopy closure was similar among spacings at R1, R3 and R5.

Trial Information

Treatment	15" vs 30"
Soil Texture	Silty Clay
Previous Crop	Corn
Tillage	Zero Till
Seeding Equipment	40 ft Planter
Seeding Date	May 28
Variety	Akras R2
Seeding Rate	162 000 seeds/ac
Harvest Date	September 29

Precipitation (mm)

	May	June	July	August
Normal	53.8	92	66.4	63.3
Rainfall	11.4	60.4	40.5	79.5

Plant Stand (plants/ac)

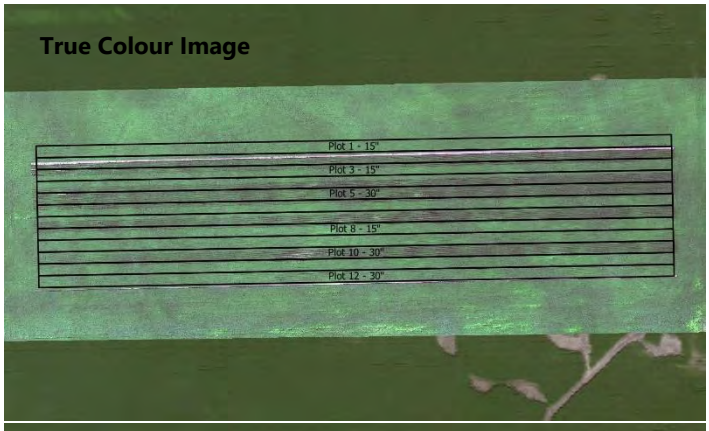
	V2	R7
15"	160,500	156,500
30"	145,000	131,500

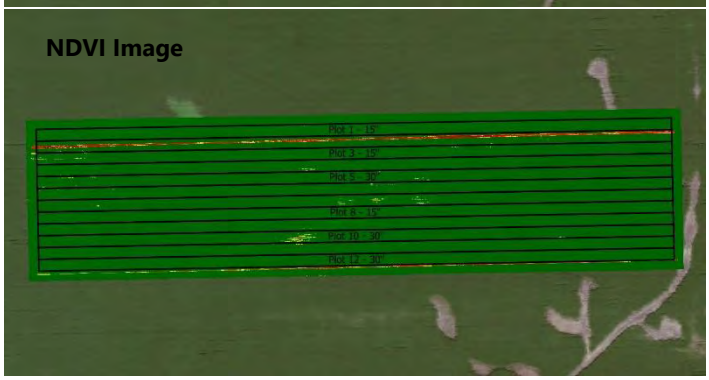
% Canopy Closure†

	R1ǂ	R3	R5
15"	86% A	92% A	92% A
30"	80% A	90% A	90% A

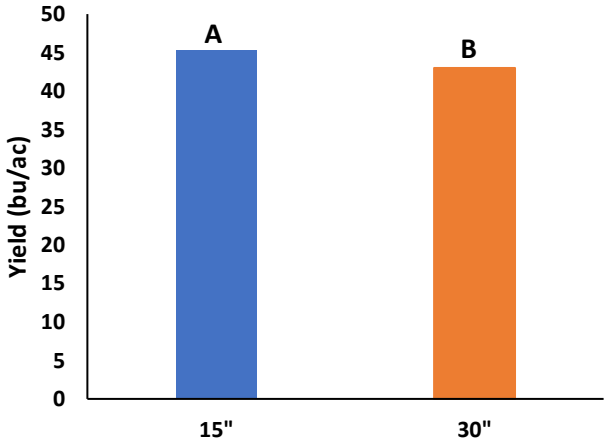
†Closure percentages in columns followed by different letters are significantly different from one another ǂHigh variability in measurements at R1 stage

Field Images August 20





Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Change in Profit/ac (@ soybean price of $10 - $12/bu) ǂ	
15”	45.3	+$23 to +$28/ac	
30”	43.0		
Yield Difference	2.3		
P-Value	0.0280		
CV	5.7%		
Significance	**Yes**	**Economic**	**Yes**

ǂ Does not account for any equipment/operating cost differences between spacings; profit reflects increase in income with the increase in yield for soybeans on 15” spacing compared to soybeans on 30” spacing

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Soybean Row Spacing Trial

Trial ID: 2020_SRS04 – R.M. of Louise

Objective: Quantify the agronomic and economic impacts of different row spacings on soybean production

Summary: Yield significantly increased by 2.4 bu/ac at 7.5" spacing compared to 15" spacing. Late season weed pressure was higher in the wider row spacing compared to the narrower spacing.

Trial Information ǂ

Treatment	7.5" vs 15" Row Spacing
Soil Texture	Clay Loam
Previous Crop	Barley
Tillage	Zero Till
Seeding Equipment	30 ft Disc Drill
Seeding Date	May 29
Variety	S0009-M2
Seeding Rate	191 000 seeds/ac
Harvest Date	September 24

ǂ Previously a perennial stand, high weed/volunteer pressure throughout the season, unable to collect accurate canopy closure data as a result. Weed Pressure evident in the true colour image

Precipitation (mm)

	May	June	July	August
Normal	61.1	89.8	68.3	72.3
Rainfall	46.4	107.9	102.8	30

Plant Stand (plants/ac)

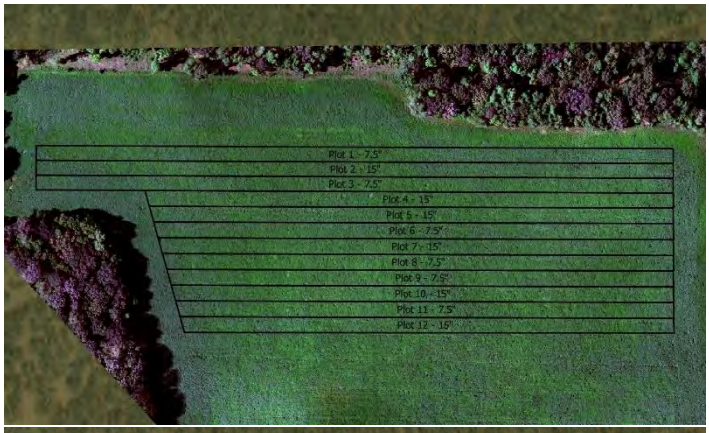
	V1	R8
7.5"	145,000	135,500
15"	158,000	138,000

Late Season Weed Pressure (R5) ǂ

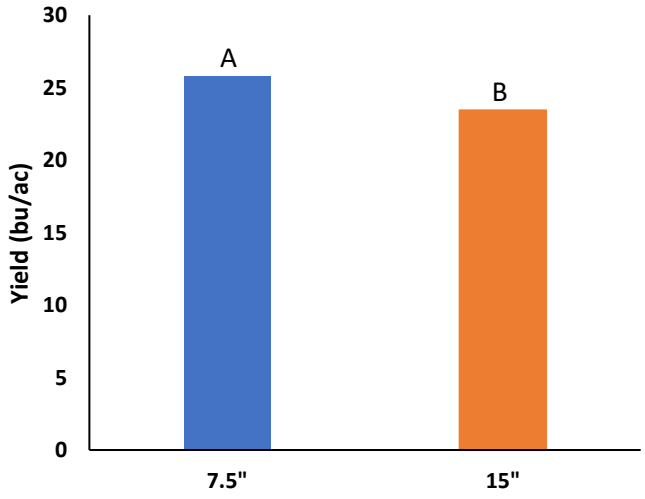
	Average # of Weeds/0.5m^2
7.5"	4.9
15"	8.9

ǂ Higher late season weed pressure in the 15" spacing compared to 30" spacing

Field Images August 15



Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Change in Profit (@ soybean price of $10 - $12/bu) ǂ	
7.5”	25.8	+$24 to +$29/ac	
15”	23.4		
Yield Difference	2.4		
P-Value	0.0383		
CV	8.7%		
Significance	**Yes**	**Economic**	**Yes**

ǂ Does not account for any equipment/operating cost differences between spacings; profit reflects increase in income with the increase in yield for soybeans on 7.5” spacing compared to soybeans on 15” spacing

Soybean Row Spacing Trial

Trial ID: 2020_SRS05 – R.M. of Grassland

Objective: Quantify the agronomic and economic impacts of different row spacings on soybean production

Summary: There was no significant yield difference between 15" and 30" spacing. The 15" rows closed more rapidly than the 30" rows and there was more closure in the 15" rows at R1, R3 and R5 compared to the 30" rows.

Trial Information

Treatment	15" vs 30" Row Spacing
Soil Texture	Loam
Previous Crop	Corn
Tillage	Zero Till
Seeding Equipment	40 ft Planter
Seeding Date	May 29
Variety	LS Solaire
Seeding Rate	170 000 seeds/ac
Harvest Date	September 22

Precipitation (mm)

	May	June	July	August
Normal	46.9	83.7	65.2	57.6
Rainfall	18.1	75.7	55.1	22.7

Plant Stand (plants/ac)

	V1	R8
15"	154,500	141,500
30"	145,000	135,500

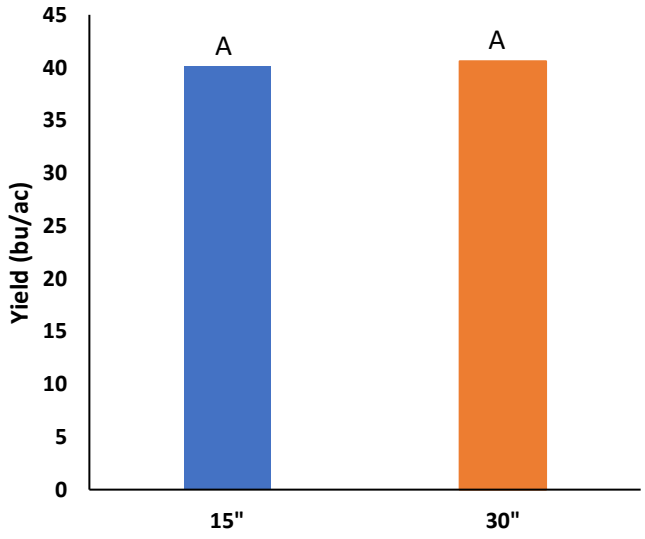
% Canopy Closure†

	R1	R3	R5
15"	77% A	91% A	91% A
30"	53% B	78% B	88% B

† Closure percentages in columns followed by different letters are significantly different from one another

NDVI Field Image August 21

Yield by Treatment



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Overall Yield & Economics

	Mean (bu/ac)	Change in Profit/ac (@ soybean price of $10 - $12/bu) ǂ	
15”	40.1	n/a	
30”	40.6	n/a	
Yield Difference	-0.5		
P-Value	0.4197		
CV	2.4%		
Significance	**No**	**Economic**	**No**

ǂ Does not account for any equipment/operating cost differences between spacings; no significant yield difference, so no change in profit with a change in row spacing

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NOTES

Soybean Seed Treatment Trial

Objective: Quantify the agronomic and economic impacts of seed treatment in soybeans.

Summary: There was no significant yield difference in soybeans with the addition of Allegiance FL to the regular seed treatment of Evergol and Stress Shield.

Table 14. Summary of 2020 soybean seed treatment yield results by site-year.

Trial ID	Rural Municipality	Seeding Date	Seeding Rate	Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
				Evergol+SS +Allegiance FL	Evergol+SS				
			'000/ac	bu/ac		bu/ac	%		
SST01	Dauphin	May 26	223	33.6	34.2	-0.6	9.4	0.7093	**No**

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Soybean Seed Treatment Trial

Trial ID: 2020_SST01 – R.M. of Dauphin

Objective: Quantify the agronomic and economic impacts of seed treatment in soybeans

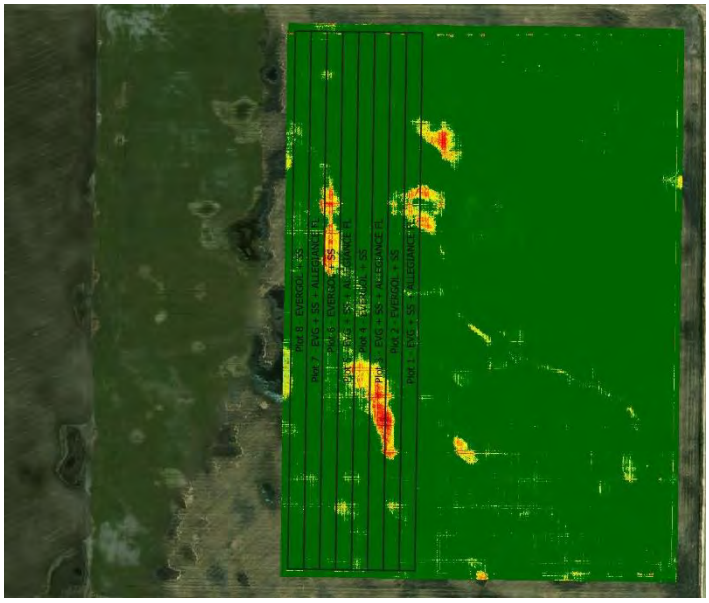
Summary: There was no significant yield difference between soybean treated with Evergol+SS and soybean treated with Evergol+SS+Allegiance FL. Root rot severity was significantly lower in the Evergol+SS treatment compared to the Evergol+SS+Allegiance FL treatment.

Trial Information ǂ

Treatment	Evergol+SS vs. Evergol+SS+Allegiance FL
Rural Municipality	Dauphin
Soil Texture	Fine Sandy Loam
Previous Crop	Ryegrass
Tillage	Zero Till
Seeding Date	May 26
Variety	Amirani R2
Seeding Rate	223 000 seeds/ac
Row Spacing	10”
Plant Stand @ VC	167 000 plants/ac
Harvest Date	September 24

ǂ Trial designed to test the addition of Allegiance FL seed treatment to this producer’s regular seed treatment practice of Evergol + Stress Shield

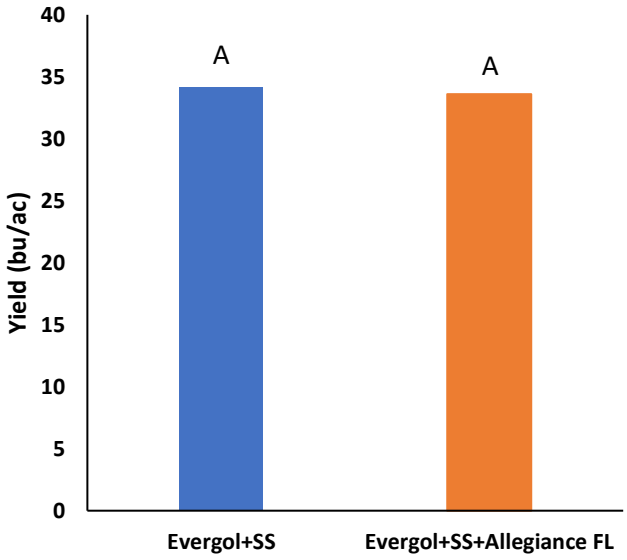
NDVI Field Image August 14



Precipitation (mm)

	May	June	July	August
Normal	54.3	86.7	73.2	63.3
Rainfall	31.8	101	67.9	98.4

Yield by Treatment



Early Season Root Rot Severity

	Root Rot Severity	Letter Group ǂ
Evergol + SS + Allegiance FL	40%	A
Evergol + SS	30%	B

ǂ Root rot was significantly more severe in the Evergol + SS + Allegiance FL compared to the Evergol + SS treatment

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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac † †
Evergol+SS+Allegiance FL	33.6	$5/ac	-$5/ac
Evergol+SS	34.2		
Yield Difference	-0.6		
P-Value	0.7093		
CV	9.4%		
Significance	**No**	**Economic**	**No**

† Based on estimated cost of seed treatment

† † There was no significant increase in yield to offset the cost of product

NOTES

Soybean Rolling Trials

Objective: Quantify the agronomic and economic impacts of rolling in soybeans.

Summary: There was no significant yield difference between unrolled soybeans and those rolled pre-emergence. For the late rolling trial, rolling at R1 significantly reduced yield compared to unrolled soybeans.

Table 15. Summary of 2020 soybean rolling trial yield results by site-year.

Trial ID	Rural Municipality	Rolling Timing	Plant Breakage	Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
				Rolled	Unrolled				
			'000/ac	bu/ac		bu/ac	%		
SR01	Brokenhead	Pre-emergence	n/a	13.2	13.5	-0.3	10.0	0.7616	**No**
SR02	Springfield	R1	47	36.6	43.4	-6.8	13.1	0.0154	**No**

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Soybean Rolling Trial

Trial ID: 2020-SR01 – R.M. of Brokenhead

Objective: Quantify the agronomic and economic impacts of rolling in soybeans

Summary: There was no significant yield difference between rolled and unrolled soybeans. Although the cost of rolling was not paid for with an increase in yield, there is potential economic gain from rolling as a preventative measure for combine damage.

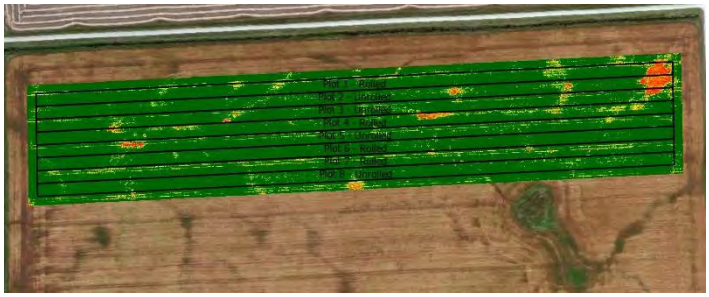
Trial Information

Treatment	Rolling (pre-emergence)
Soil Texture	Clay
Previous Crop	Wheat
Tillage	Conventional
Seeding Equipment	Air Drill
Seeding Date	June 12
Variety	OAC Prudence
Row Spacing	9"
Plant Stand @ V1	160 000 plants/ac
Harvest Date	November 2

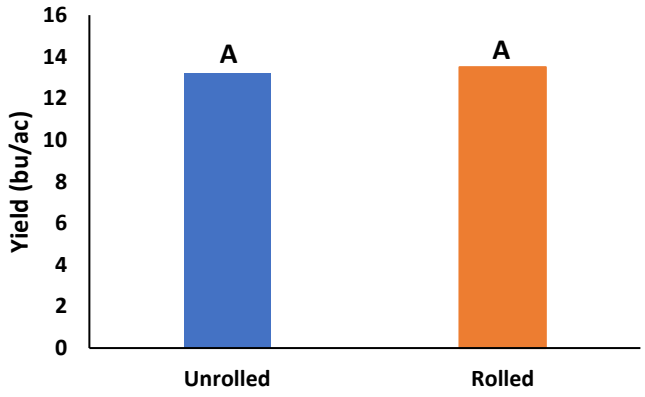
Precipitation (mm)

	May	June	July	August
Normal	54	89.9	73.4	72.6
Rainfall	11.3	74.9	49.8	110.7

NDVI Field Image August 19



Yield by Treatment



Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac ǂǂ
Rolled	13.2	$5/ac	-$5/ac
Unrolled	13.5		
Yield Difference	-0.3		
P-Value	0.7616		
CV	10.0%		
Significance	**No**	**Economic**	**No***

ǂ Based on estimated cost of rolling

ǂ ǂ Because yields were not significantly different, there is no increased income to offset the cost of rolling

***Note: even though there was no increase in yield to offset the cost of rolling, the cost may be justified based on individual producer's risk tolerance and field conditions as a preventative measure for combine damage**

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Soybean Rolling Trial

Trial ID: 2020-SR02 – R.M. of Springfield

Objective: Quantify the agronomic and economic impacts of late rolling in soybeans

Summary: Late rolling caused extensive plant damage. Yield significantly decreased with late rolling, by 6.8 bu/ac. As a result, late rolling was not economic.

Trial Information†

Treatment	Late Rolling (R1)
Soil Texture	Clay
Previous Crop	Ryegrass
Tillage	Zero Till
Seeding Equipment	60 ft Planter
Seeding Date	May 22
Variety	NSC Sperling RR2Y
Row Spacing	15”
Plant Stand @ R1	129 000 plants/ac
Harvest Date	September 22

† Rolling after V2 is not recommended; this trial was designed to test late rolling

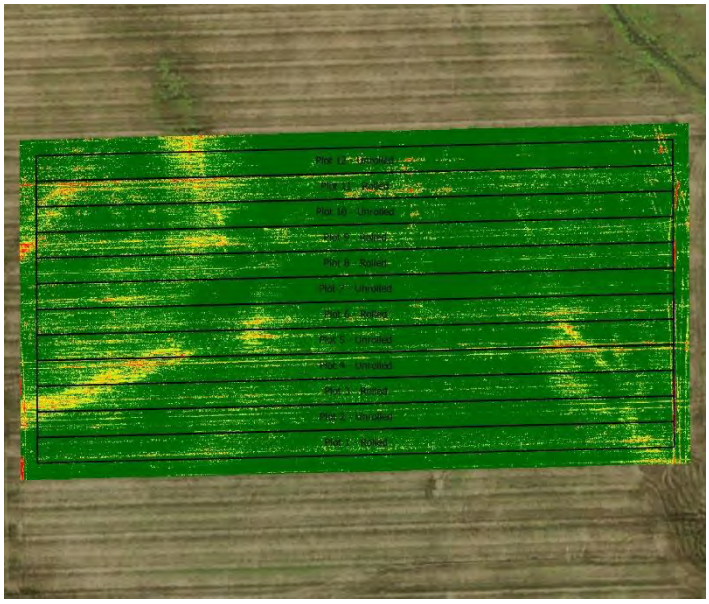
Precipitation (mm)

	May	June	July	August
Normal	54.4	90.7	81.1	73.7
Rainfall	19.6	58.1	30.5	85

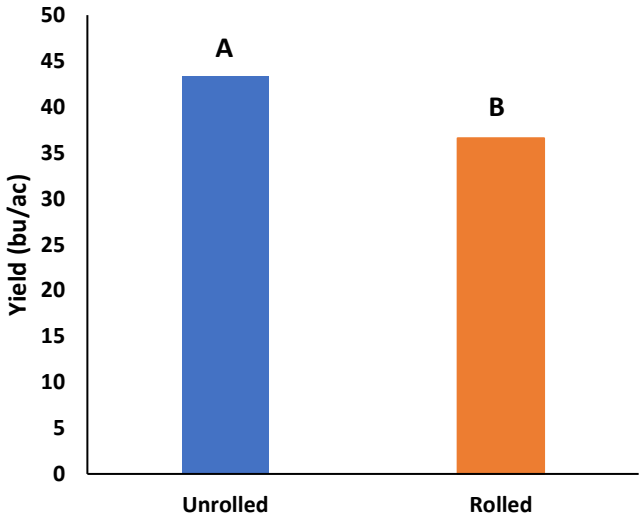
Post-Rolling Breakage

	Breakage (R1, after rolling)
Rolled	47 000 plants/ac
Unrolled	0 plants/ac

NDVI Field Image August 19



Yield by Treatment



[Additional On-Farm Network Research Reports]

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Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac (@ soybean price $10-$12/bu) ǂǂ
Rolled	36.6	$5/ac	-$73 to -$87/ac
Unrolled	43.4		
Yield Difference	-6.8		
P-Value	0.0154		
CV	13.1%		
Significance	**Yes**	**Economic**	**No**

ǂ Based on estimated cost of rolling

ǂ ǂ Change in profit is calculated using the change in income/ac due to the significant yield difference and the cost/ac of rolling

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Soybean Biological Trials

Objective: Quantify the agronomic and economic impacts of biological products in soybeans.

Summary: There was no significant yield difference between untreated soybeans and soybeans treated with Heads Up, Lignijoule or Ez-Gro Prime. A foliar application of Crop Aid significantly reduced yield compared to soybeans without the foliar application (SB02).

Table 16. Summary of 2020 soybean biological trial yield results, by site-year

Trial ID	Rural Municipality	Application Timing	Product	Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
				Treated	Untreated				
				bu/ac		bu/ac	%		
SB01	Dauphin	Seeding	Heads Up	40.5	41.5	-1.0	7.3	0.2057	**No**
SB02	Brokenhead	R2	Crop Aid	47.9	49.7	**-1.8**	7.1	0.0496	**Yes**
SB03	North Cypress-Langford	Seeding	Lignijoule	51.1	51.5	-0.4	1.6	0.4421	**No**
SB04	Lorne	V2	EZ Gro Prime	38.0	39.2	-1.2	3.1	0.0927	**No**

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Soybean Biological Trial

Trial ID: 2020-SB01 – R.M. of Dauphin

Objective: Quantify the agronomic and economic impacts of biological products for soybean production

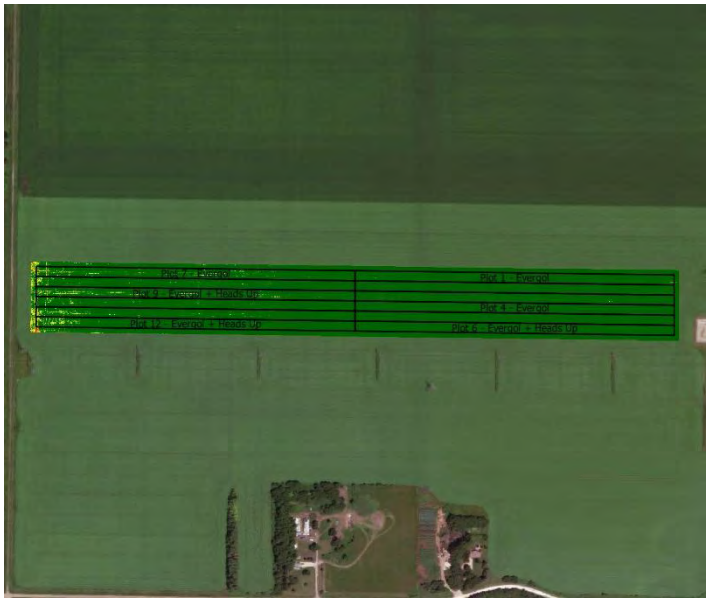
Summary: There was no significant yield difference between soybeans treated with HeadsUp and those without. Early season root rot severity was not significantly different between treatments. Due to the lack of yield response, there was a decrease in profit/ac equivalent to the cost of product application.

Trial Information†

Treatment	HeadsUp Seed Treatment
Soil Texture	Clay
Previous Crop	Wheat
Tillage	Conventional
Seeding Date	May 18
Variety	Amirani R2
Seeding Rate	200 000 seeds/ac
Row Spacing	10”
Plant Stand @ V2	190 000 plants/ac
Harvest Date	September 13

† HeadsUp seed treatment is a biological product intended to reduce fungal and bacterial disease pressure

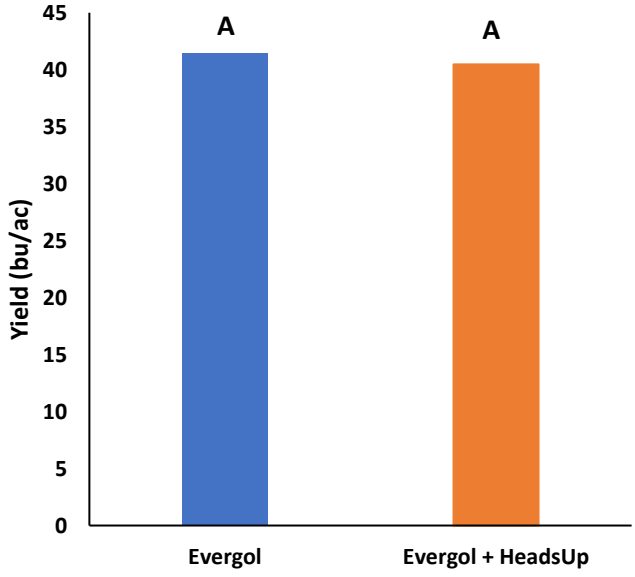
NDVI Field Image August 14



Precipitation (mm)

	May	June	July	August
Normal	54.3	86.7	73.2	63.3
Rainfall	31.8	101	67.9	98.4

Yield by Treatment



Early Season Root Rot Severity†

	Root Rot Severity	Letter Group†
Evergol + HeadsUp	43%	A
Evergol	37%	A

† No significant difference in root rot severity between treatments

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Overall Yield & Economics

	Mean (bu/ac)	Cost †	Change in Profit/ac ††
Evergol + HeadsUp	40.5	$5/ac	-$5/ac
Evergol	41.5		
Yield Difference	-1.0		
P-Value	0.2057		
CV	7.3%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for biological products

†† Yields were not significantly different, therefore there is no increased income to offset the cost of the biological product

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Soybean Biological Trial

Trial ID: 2020-SB02 – R.M. of Brokenhead

Objective: Quantify the agronomic and economic impacts of biological products for soybean production

Summary: Soybean yield was significantly reduced by 1.8 bu/ac where foliar Crop Aid was used in addition to Crop Aid seed treatment, compared to yield of soybeans with Crop Aid seed treatment alone. Due to the significant decrease in yield, there was a loss in profit/ac based on the decreased income and cost of product.

Trial Information ǂ

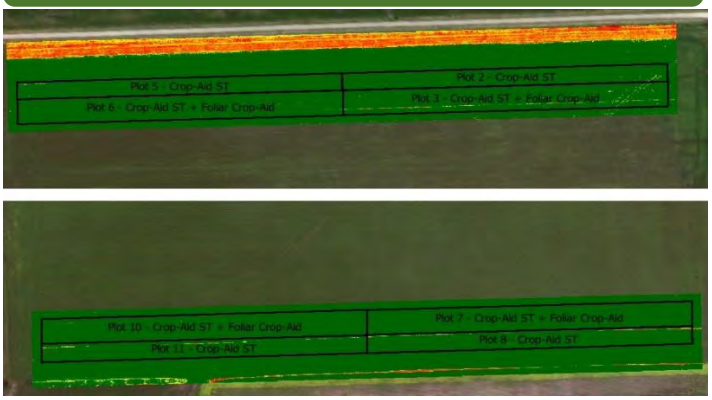
Treatment	Crop Aid Foliar @ R2
Soil Texture	Clay Loam
Previous Crop	Wheat
Tillage	Conventional
Seeding Date	May 18
Variety	24-10RY
Seeding Rate	200 000 seeds/ac
Row Spacing	6"
Plant Stand @ R1	234 000 plants/ac
Harvest Date	September 23

ǂ Crop Aid seed treatment is intended to promote germination and vigour. Crop Aid foliar is intended to promote healthy plants and supplement a fertilizer program. Crop aid seed treatment was used in both treatments.

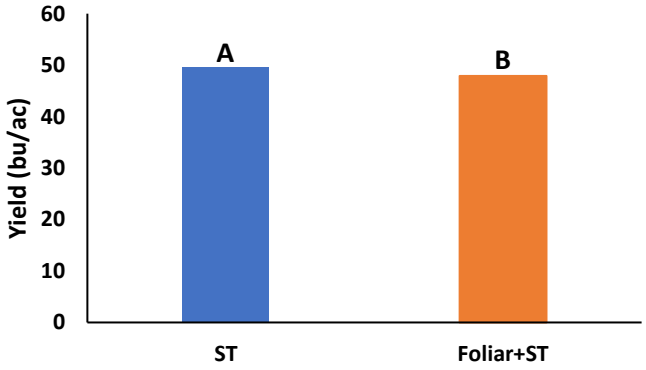
Precipitation (mm)

	May	June	July	August
Normal	54	89.9	73.4	72.6
Rainfall	11.3	74.9	49.8	110.7

NDVI Field Image August 19



Yield by Treatment



Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac (@ soybean price of $10 - $12/bu) ǂǂ
Foliar + Seed Treatment	47.9	$5/ac	-$23 to -$27/ac
Seed Treatment	49.7		
Yield Difference	-1.8		
P-Value	0.0496		
CV	7.1%		
Significance	**Yes**	**Economic**	**No**

ǂ Based on an estimated cost for biological products

ǂǂ Change in profit is calculated using the change in income per acre from the significant yield decline, and the cost of product per acre

[Additional On-Farm Network Research Reports]

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Soybean Biological Trial

Trial ID: 2020-SB03 – R.M. of North Cypress-Langford

Objective: Quantify the agronomic and economic impacts of biological products for soybean production

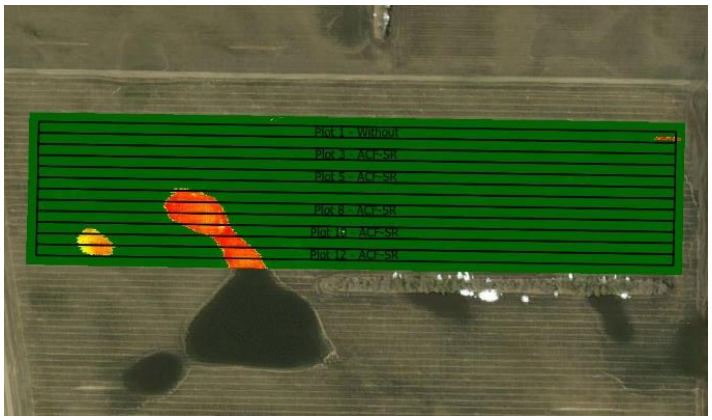
Summary: There was no significant yield difference between soybeans with and without ACF-SR. As a result, profit in the treated area decreased by the cost of product/ac, compared to profit from the untreated area.

Trial Information†

Treatment	ACF-SR In-furrow
Soil Texture	Clay Loam
Previous Crop	Wheat
Tillage	Conventional
Seeding Date	May 27
Variety	S007-Y4
Seeding Rate	204 000 seeds/ac
Row Spacing	10"
Plant Stand @ V3	197 000 plants/ac
Harvest Date	October 1

† ACF-SR is intended to promote plant growth

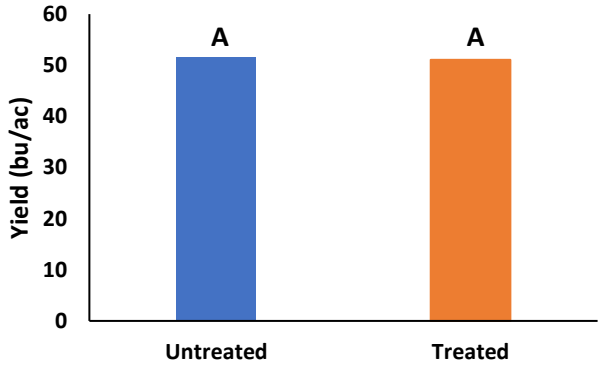
NDVI Field Image August 15



Precipitation (mm)

	May	June	July	August
Normal	51.2	72.8	74.4	66.2
Rainfall	8.7	94.5	62.5	69.9

Yield by Treatment



Overall Yield & Economics

	Mean (bu/ac)	Cost†	Change in Profit/ac††
Treated	51.1	$5/ac	-$5/ac
Untreated	51.5		
Yield Difference	-0.4		
P-Value	0.4421		
CV	1.6%		
Significance	**No**	**Economic**	**No**

† Based on an estimated cost for biological products

†† Because yields were not significantly different, there is no increased income to offset the cost of the product. Profit/ac declines by the cost of the product application.

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Soybean Biological Trial

Trial ID: 2020-SB04 – R.M. of Lorne

Objective: Quantify the agronomic and economic impacts of biological products for soybean production

Summary: There was no significant yield difference between soybeans with and without EZ Gro Prime. Due to the lack of yield response, there was a decrease in profit/ac in the treated area of the trial, equivalent to the cost of the product application.

Trial Information ǂ

Treatment	EZ Gro Prime @ V2
Soil Texture	Clay Loam
Previous Crop	Wheat
Tillage	Conventional
Variety	Nocoma R2
Seeding Rate	190 000 seeds/ac
Row Spacing	15”
Plant Stand @ V2	146 000 plants/ac
Harvest Date	September 18

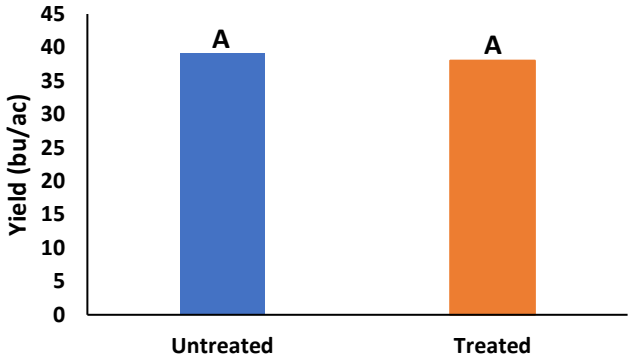
ǂ Ez Gro Prime is intended to improve root growth, grain size and quality.

NDVI Field Image August 15

Precipitation (mm)

	May	June	July	August
Normal	54.7	83.2	78.6	65.1
Rainfall	30.9	52.2	103.8	27.6

Yield by Treatment



Overall Yield & Economics

	Mean (bu/ac)	Cost ǂ	Change in Profit/ac ǂ ǂ
Treated	38.0	$5/ac	-$5/ac
Untreated	39.2		
Yield Difference	-1.2		
P-Value	0.0927		
CV	3.1%		
Significance	**No**	**Economic**	**No**

ǂ Based on an estimated cost for biological products

ǂ ǂ Yields were not significantly different, therefore there is no increased income to offset the cost of the biological product

[Additional On-Farm Network Research Reports]

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Malt Barley Variety Trial

Objective: The purpose of this project is to quantify the agricultural characteristics and malting quality of barley varieties across Manitoba.

Summary: One site-year showed a significant difference in yield, plant stand and germination. All varieties except CDC Copper had good germination and met malting quality.

Trial ID	Rural Municipality	Seeding Date	Variety	Pland Stand /ft^2	Yield bu/ac	Protein %	Germination %	CV %	P-Value	Statistically Significant @ 95%
2020-BV01	Morris	Apr 30	AAC Synergy	16	84.1	11.6	96.4	13.3	0.1490	No
			CDC Fraser	14	71.1	12.2	96.4			
2020-BV02	Victoria	May 12	AAC Synergy	17	92.4	11.9	99.0	5.4	0.0765	No
			AAC Connect	17	85.3	11.6	98.8			
2020-BV03	Oakland-Wawanesa	May 20	AAC Synergy	16	95.1	11.5	98.6	6.3	0.0353	Yes
			AAC Connect	18	91.6	11.3	98.3			
			AAC Goldman	11	85.0	11.8	96.5			
2020-BV04	Argyle	May 22	AAC Synergy	13	86.7	11.8	98.9	6.2	0.0783	No
			CDC Fraser	15	79.0	11.8	99.1			
			CDC Copper	15	86.0	11.8	91.6			
			CDC Bow	13	81.9	11.9	97.8			
2020-BV05	Pembina	May 22	AAC Synergy	21	97.7	11.2	97.9	6.1	0.6600	No
			AAC Connect	20	95.7	11.6	96.6			
			CDC Copper	21	100.0	11.6	93.6			

Indicates Statistical Difference at 95% confidence interval

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Variety Trial—Malt Barley

Trial ID: 2020-BV01 — R.M. of Morris

Objective: The purpose of this project is to quantify the agricultural characteristics and malting quality of barley varieties across Manitoba.

TRIAL INFORMATION	
Location	Lowe Farm
Previous Crop	Canola
Soil Texture	Clay
Tillage	Conventional
Planting Date	April 30, 2020
Varieties	AAC Synergy CDC Fraser
Row Spacing	9”
Seeding Rate	105 lbs/ac
Fertilizer (N-P-K-S)	95N 30P 40K
Harvest Date	August 20, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	11	79	99	118	**306**
Normal	56	84	65	74	**278**

†Growing season precipitation (mm)

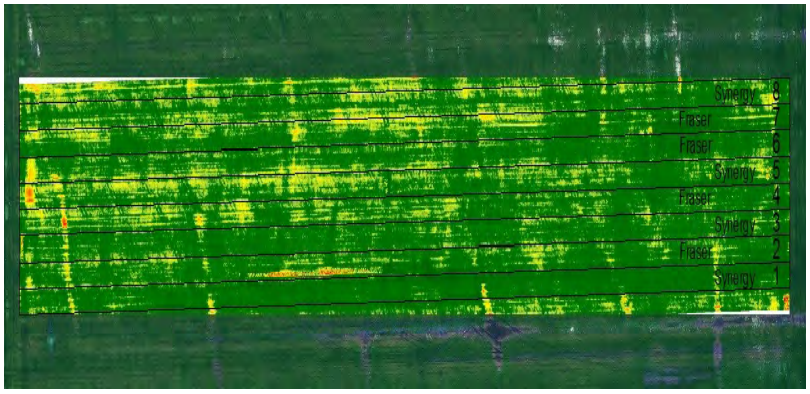
BARLEY QUALITY

	Plant Stand/ft^2	Protein (%)	Germination (%)
AAC Synergy	16^A	11.6	96.4
CDC Fraser	14^A	12.2	96.4

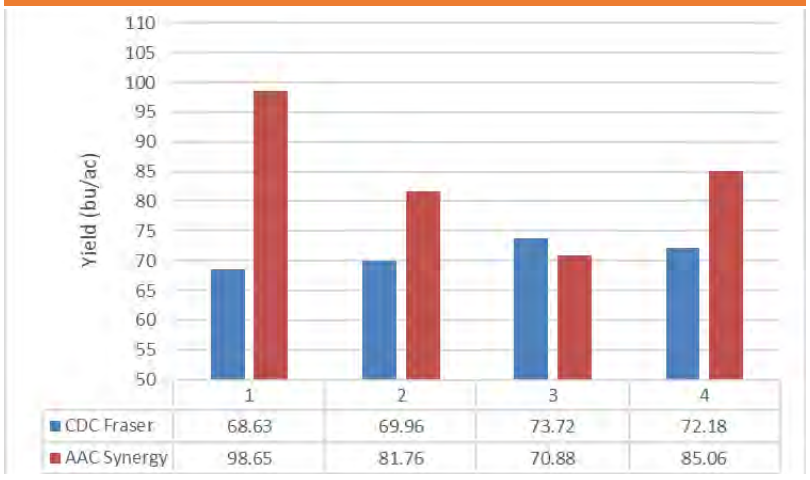
OVERALL YIELD

	Mean (bu/ac)
AAC Synergy	84.1^A
CDC Fraser	71.1^A
P-Value	0.149
CV	13.29%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant difference in yield between the two treatments. Rainfall was slightly above normal throughout the growing season. Germination was excellent and both varieties made malting quality.

MCA and CMBTC would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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Variety Trial—Malt Barley

Trial ID: 2020-BV02 — R.M. of Victoria

Objective: The purpose of this project is to quantify the agricultural characteristics and malting quality of barley varieties across Manitoba.

TRIAL INFORMATION	
Location	Holland
Previous Crop	Canola
Soil Texture	Clay Loams
Tillage	Conventional
Planting Date	May 12, 2020
Varieties	AAC Connect AAC Synergy
Row Spacing	7.5”
Seeding Rate	96 lbs/ac
Fertilizer (N-P-K-S)	105N 10P 16K
Harvest Date	August 12, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	17	39	98	29	**183**
Normal	61	83	79	77	**300**

†Growing season precipitation (mm)

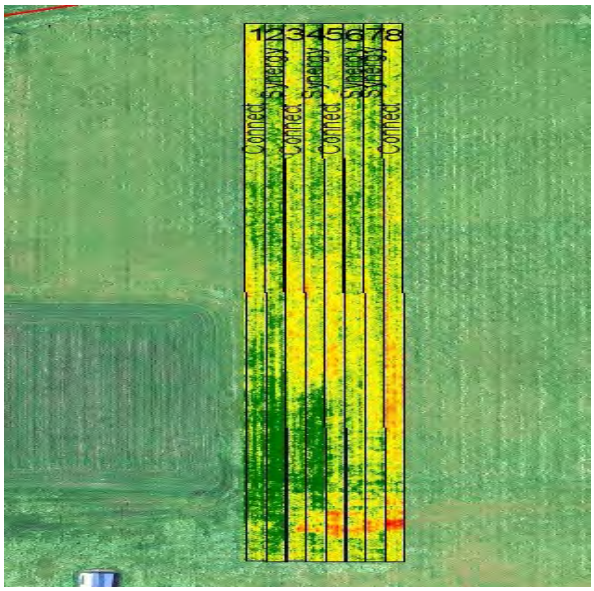
BARLEY QUALITY

	Plant Stand/ft^2	Protein (%)	Germination (%)
AAC Connect	17^A	11.6	98.8
AAC Synergy	17^A	11.9	99.0

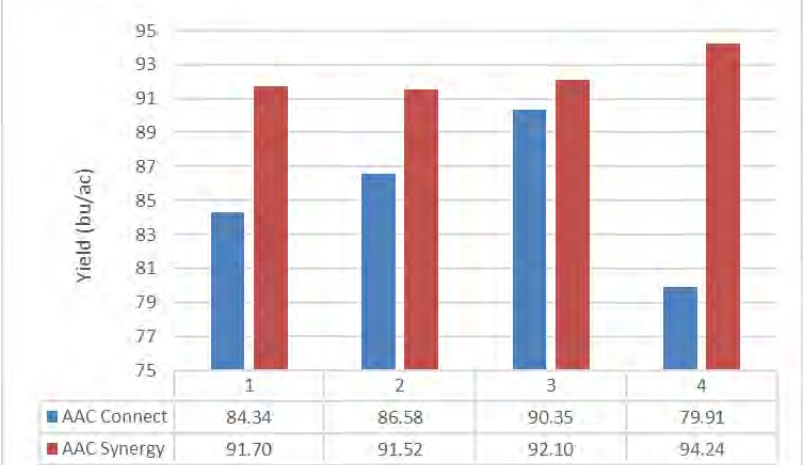
OVERALL YIELD

	Mean (bu/ac)
AAC Connect	85.3^A
AAC Synergy	92.4^A
P-Value	0.0765
CV	5.42%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant difference in yield between the two treatments. Rainfall was well below normal for the growing season. Germination was excellent and both varieties made malting quality.

MCA and CMBTC would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

Variety Trial—Malt Barley

Trial ID: 2020-BV03 — R.M. of Oakland-Wawanesa

Objective: The purpose of this project is to quantify the agricultural characteristics and malting quality of barley varieties across Manitoba.

TRIAL INFORMATION	
Location	Wawanesa
Previous Crop	Soybeans
Soil Texture	Fine Loams
Tillage	Conventional
Planting Date	May 20, 2020
Varieties	AAC Connect AAC Synergy AAC Goldman
Row Spacing	10”
Seeding Rate	86 lbs/ac
Fertilizer (N-P-K-S)	60N 30P
Harvest Date	August 19, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	22	52	87	60	**222**
Normal	53	67	72	75	**267**

†Growing season precipitation (mm)

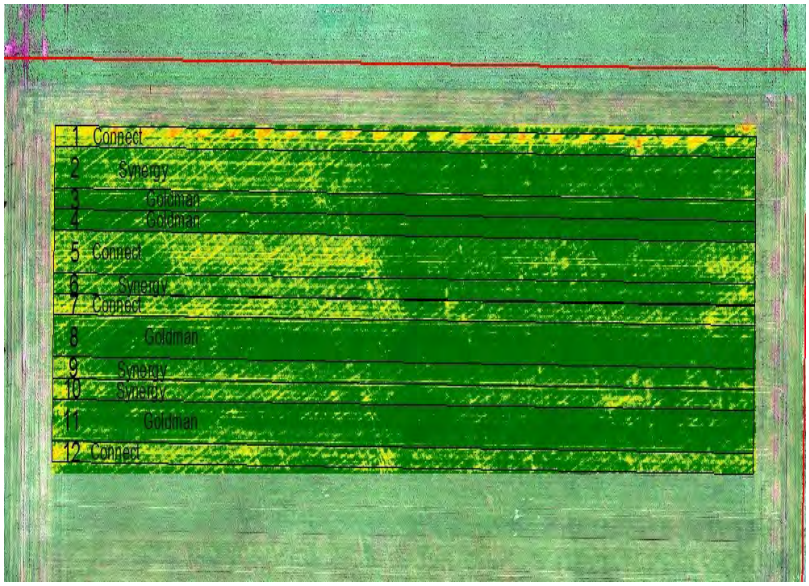
BARLEY QUALITY

	Plant Stand/ft^2	Protein (%)	Germination (%)
AAC Connect	18^{A}	11.3	98.3
AAC Synergy	16^{A}	11.5	98.6
AAC Goldman	11^{B}	11.8	96.5

OVERALL YIELD

	Mean (bu/ac)
AAC Connect	91.6^{AB}
AAC Synergy	95.1^{A}
AAC Goldman	85.0^{B}
P-Value	0.0353
CV	6.32%
Significance	**Yes**

FIELD IMAGE



STRIP YIELD

Summary: There was a significant difference in yield between AAC Synergy and AAC Goldman. AAC Goldman emerged later relative to the other varieties and had a thinner plant stand. Rainfall was below normal for the growing season. Germination was excellent and all three varieties made malting quality.

MCA and CMBTC would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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Variety Trial—Malt Barley

Trial ID: 2020-BV04 — R.M. of Argyle

Objective: The purpose of this project is to quantify the agricultural characteristics and malting quality of barley varieties across Manitoba.

TRIAL INFORMATION

Location	Baldur
Previous Crop	Canola
Soil Texture	Fine Loams
Tillage	Zero Tillage
Planting Date	May 22, 2020
Varieties	CDC Fraser AAC Synergy CDC Copper CDC Bow
Row Spacing	7.5”
Seeding Rate	96 lbs/ac
Fertilizer (N-P-K-S)	103N 40P 40K 20S
Harvest Date	August 25, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	25	30	115	42	**211**
Normal	63	93	61	80	**297**

†Growing season precipitation (mm)

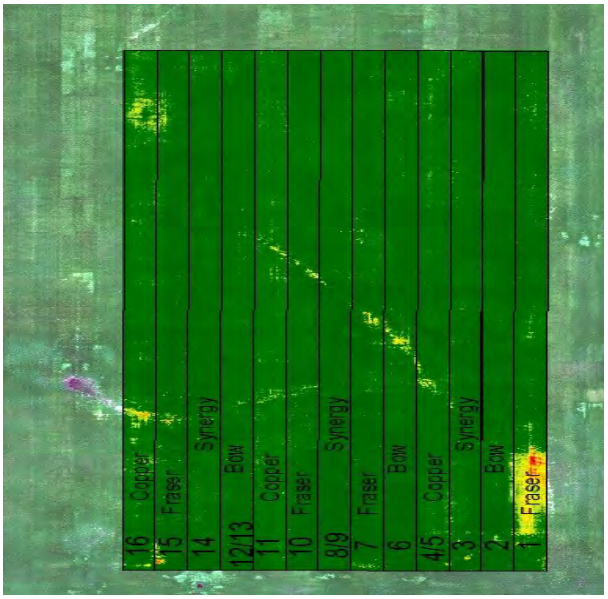
BARLEY QUALITY

	Plant Stand/ft^2	Protein (%)	Germination (%)
CDC Fraser	15^A	11.8	99.1
AAC Synergy	13^A	11.8	98.9
CDC Copper	15^A	11.8	91.6
CDC Bow	13^A	11.9	97.8

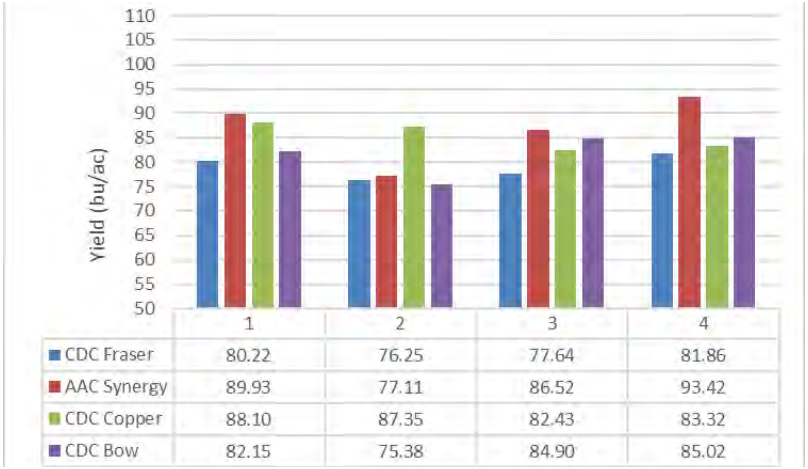
OVERALL YIELD

	Mean (bu/ac)
CDC Fraser	79.0^A
AAC Synergy	86.7^A
CDC Copper	86.0^A
CDC Bow	81.9^A
P-Value	0.0783
CV	6.19%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant yield difference between the four varieties. Rainfall was well below normal for the growing season. Germination was excellent for three varieties (Fraser, Synergy and Bow) and met malting quality. Germination was poor for Copper which did not meet malting quality.

MCA and CMBTC would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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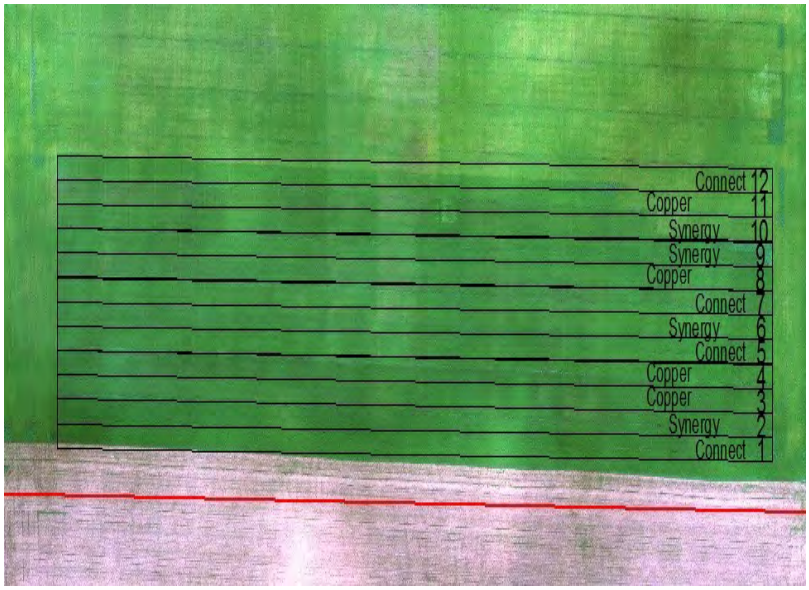
Variety Trial—Malt Barley

Trial ID: 2020-BV05 — R.M. of Pembina

Objective: The purpose of this project is to quantify the agricultural characteristics and malting quality of barley varieties across Manitoba.

TRIAL INFORMATION	
Location	Manitou
Previous Crop	Canola
Soil Texture	Course Loams
Tillage	Minimal Tillage
Planting Date	May 22, 2020
Varieties	AAC Synergy AAC Connect CDC Copper
Row Spacing	7.5”
Seeding Rate	100 lbs/ac
Fertilizer (N-P-K-S)	54N 16P
Harvest Date	August 26, 2020

FIELD IMAGE



PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	48	31	97	24	**201**
Normal	61	104	61	73	**299**

†Growing season precipitation (mm)

STRIP YIELD

BARLEY QUALITY

	Plant Stand/ft^2	Protein (%)	Germination (%)
AAC Synergy	21^A	11.2	97.9
AAC Connect	20^A	11.6	96.6
CDC Copper	21^A	11.6	93.6

OVERALL YIELD

	Mean (bu/ac)
AAC Synergy	97.7^A
AAC Connect	95.7^A
CDC Copper	100.0^A
P-Value	0.66
CV	6.11%
Significance	No

Summary: There was no significant difference in plant stand and yield between the three treatments. Rainfall was well below normal for the growing season. AAC Synergy and AAC Connect both had excellent germination and met malt quality standards. CDC Copper did not meet malt quality standards (% Germ < 95).

MCA and CMBTC would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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Corn Seed Rate Trial

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate by 3,000 seeds/ac in corn.

Summary: 4 site-years showed a significant yield difference between the three seeding rates.

Single Site Analysis

Trial ID	Rural Municipality	Seeding Date	Row Spacing	Seed Rate (check)	Plant Stand @ V2			Yield			CV	P-Value	Statistically Significant @ 95%
					High Seed Rate	Check Seed Rate	Low Seed Rate	High Seed Rate	Check Seed Rate	Low Seed Rate			
			inch	seeds/ac	seeds/ac			bu/ac			%		
2020-CRNP01	North Norfolk	May 13	30	31,000	34,000	31,500	29,000	138.5	145.9	150.1	5.8	0.2080	No
2020-CRNP02	North Norfolk	May 11	30	35,000	35,250	32,500	30,750	155.0	155.4	152.0	2.3	0.0698	No
2020-CRNP03	Hanover	May 12	30	33,000	35,500	29,250	28,250	78.6	73.5	75.7	14.8	0.4653	No
2020-CRNP04	Wallace-Woodworth	May 7	30	36,000	31,250	29,250	23,500	108.1	104.4	101.4	3.4	0.0046	Yes
2020-CRNP05	De Salaberry	May 16	22	33,000	28,250	29,750	27,250	142.7	140.7	127.4	5.9	0.0034	Yes
2020-CRNP06	Rhineland	May 15	10	42,000	42,000	40,250	36,500	156.2	161.4	169.6	4.7	0.0096	Yes
2020-CRNP07	Stanley	May 16	30	34,400	36,800	34,500	30,300	182.9	183.6	186.6	2.9	0.5890	No
2020-CRNP08	De Salaberry	May 17	22	30,000	28,250	24,740	23,500	153.2	143.7	141.6	4.1	0.0090	Yes
2020-CRNP09	Dufferin	May 19	20	34,000	36,250	34,000	32,250	127.7	128.9	126.7	1.9	0.2980	No
2020-CRNP10	Hanover	May 19	22	34,660	36,750	34,000	30,250	147.4	147.6	145.1	1.8	0.3110	No
2020-CRNP11	Glenboro-South Cypress	May 22	30	34,000	32,250	29,750	27,500	150.1	150.6	148.2	3.7	0.3383	No
Average				**34,278**	**34,232**	**31,772**	**29,005**	**140**	**140**	**139**	**5**		

Indicates Statistical Difference at 95% confidence interval

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Corn Seed Rate Trial cont'd

Economic Analysis

Trial ID	Seed Rate (check)	Seed Cost/Acre			Yield			Net Profit/Acre (Seed Costs)			CV	P-Value	Statistically Significant @ 95%
		High Seed Rate	Check Seed Rate	Low Seed Rate	High Seed Rate	Check Seed Rate	Low Seed Rate	High Seed Rate	Check Seed Rate	Low Seed Rate			
	seeds/ac	$/ac			bu/ac			$/ac			%		
2020-CRNP04	36,000	$ 117.00	$ 108.00	$ 99.00	**108.1**	104.4	101.4	**$ 423.50**	$ 414.00	$ 408.00	3.4	0.0046	Yes
2020-CRNP05	33,000	$ 108.00	$ 99.00	$ 90.00	**142.7**	140.7	127.4	**$ 605.50**	$ 604.50	$ 547.00	5.9	0.0034	Yes
2020-CRNP06	42,000	$ 135.00	$ 126.00	$ 117.00	156.2	161.4	**169.6**	$ 646.00	$ 681.00	**$ 731.00**	4.7	0.0096	Yes
2020-CRNP08	30,000	$ 99.00	$ 90.00	$ 81.00	**153.2**	143.7	141.6	$ 667.00	**$ 628.50**	$ 627.00	4.1	0.0090	Yes

Indicates Statistical Difference at 95% confidence interval

Median Seed Cost of $240/bag

Corn Grain Price - $5.00/bushel

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Corn Seed Rate

Trial ID: 2020-CRNP01 — R.M. of North Norfolk

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate by 3,000 seeds/ac in corn.

TRIAL INFORMATION	
Location	Bagot
Previous Crop	Wheat
Soil Texture	Clay Loam
Tillage	Conventional
Planting Date	May 13, 2020
Fertilizer (N-P-K-S)	132N 16P 50K 20S
Variety	P7527AM
Row Spacing	30”
Seed Rate (seeds/ac)	34k vs 31k vs 37k
Harvest Date	October 09, 2020

SOIL PROPERTIES†

N 0-24”	P (ppm)	K (ppm)	% O.M.
94	10	170	2.9

†Nutrient values measured at V2

PLANT STAND @ V2

Seed Rate (seeds/ac)	31,000	34,000	37,000
Plant stand/ac	29,000	31,500	34,000

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	10	36	44	65	**155**
Normal	52	77	63	76	**267**

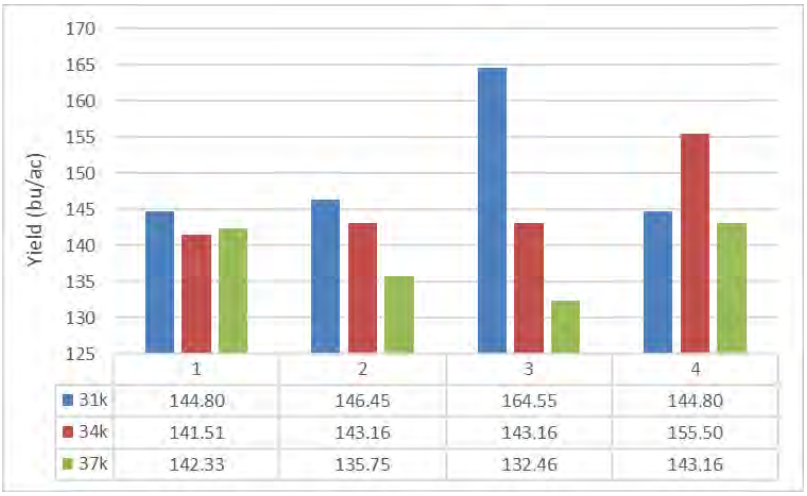
†Growing season precipitation (mm)

OVERALL YIELD

	Mean (bu/ac)
31,000 seeds/ac	150.1[A]
34,000 seeds/ac	145.9[A]
37,000 seeds/ac	138.5[A]
P-Value	0.208
CV	5.76%
Significance	No

FIELD IMAGE - AUG 15, 2020

STRIP YIELD



Summary: There was no significant difference in yield or plant stands at V2 between the 31,000, 34,000 and 37,000 seeds/acre seeding rates. Rainfall was well below average throughout the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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Corn Seed Rate

Trial ID: 2020-CRNP02 — R.M. of North Norfolk

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate by 3,000 seeds/ac in corn.

TRIAL INFORMATION	
Location	MacGregor
Previous Crop	Dry Beans
Soil Texture	Sands
Tillage	Conventional
Planting Date	May 11, 2020
Fertilizer (N-P-K-S)	120N 60P 40K 20S
Variety	TH7578 VT2P
Row Spacing	30”
Seed Rate (seeds/ac)	35k vs 32k vs 38k
Harvest Date	October 13, 2020

SOIL PROPERTIES†			
N 0-24”	**P (ppm)**	**K (ppm)**	**% O.M.**
41	39	114	1.2

†Nutrient values measured at V2

PLANT STAND @ V2			
Seed Rate (seeds/ac)	32,000	35,000	38,000
Plant stand/ac	30,750^{B}	32,500^{AB}	35,250^{A}

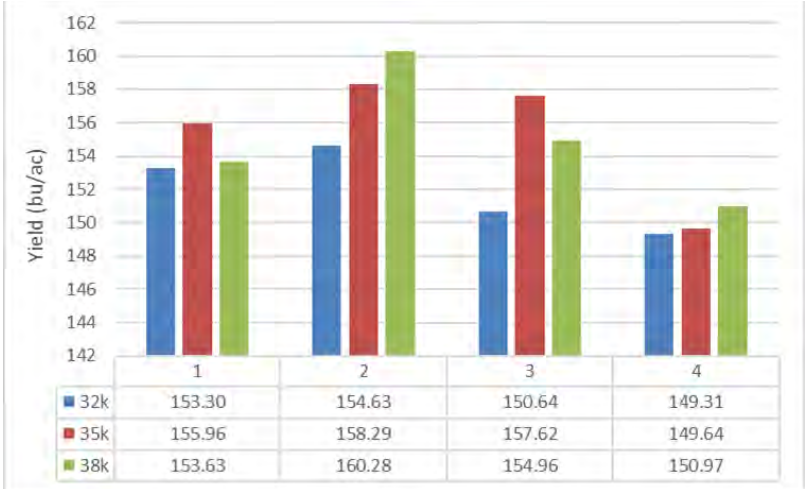
PRECIPITATION†					
	May	**June**	**July**	**Aug**	**Total**
Rainfall	10	36	44	65	**155**
Normal	52	77	63	76	**267**

†Growing season precipitation (mm)

OVERALL YIELD	
	Mean (bu/ac)
32,000 seeds/ac	152.0^{A}
35,000 seeds/ac	155.4^{A}
38,000 seeds/ac	155.0^{A}
P-Value	0.0698
CV	2.30%
Significance	No

FIELD IMAGE—AUG 15, 2020

STRIP YIELD



Summary: There was no significant difference in yield between the 32,000, 35,000 and 38,000 seeds/acre seeding rates. There was a significant difference in plant stands taken at V2. Rainfall was well below average throughout the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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Corn Seed Rate

Trial ID: 2020-CRNP03 — R.M. of Hanover

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate by 3,000 seeds/ac in corn.

TRIAL INFORMATION	
Location	Pansy
Previous Crop	Corn
Soil Texture	Fine Loam
Tillage	Minimal Tillage
Planting Date	May 12, 2020
Fertilizer (N-P-K-S)	180N
Variety	P7861YHR
Row Spacing	30”
Seed Rate (seeds/ac)	33k vs 30k vs 36k
Harvest Date	October 15, 2020

SOIL PROPERTIES†			
N 0-24”	**P (ppm)**	**K (ppm)**	**% O.M.**
75	19	56	2.1

†Nutrient values prior to spring seeding

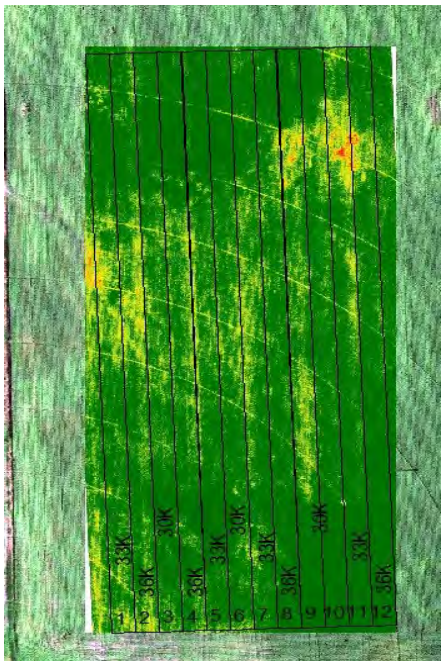
PLANT STAND @ V2			
Seed Rate (seeds/ac)	30,000	33,000	36,000
Plant stand/ac	28,250^{B}	29,250^{B}	35,500^{A}

PRECIPITATION†					
	May	**June**	**July**	**Aug**	**Total**
Rainfall	30	65	130	62	**288**
Normal	61	86	77	76	**300**

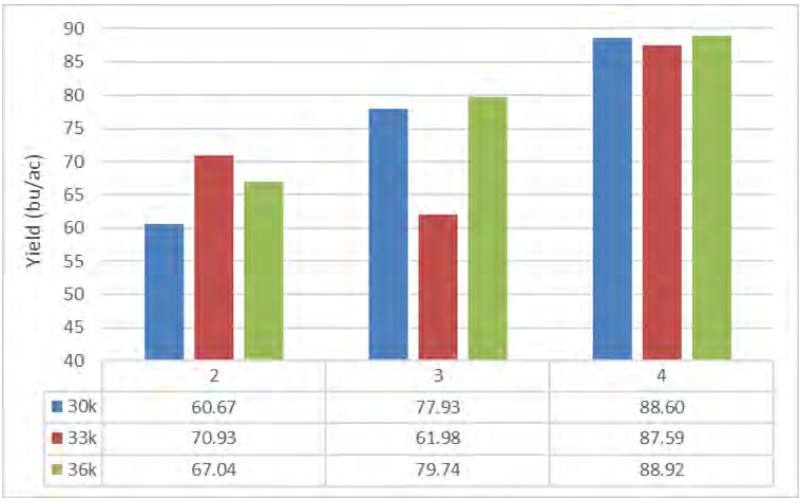
†Growing season precipitation (mm)

OVERALL YIELD	
	Mean (bu/ac)
30,000 seeds/ac	75.7^{A}
33,000 seeds/ac	73.5^{A}
36,000 seeds/ac	78.6^{A}
P-Value	0.4653
CV	14.84%
Significance	No

FIELD IMAGE—AUG 17, 2020



STRIP YIELD



Summary: There was no significant difference in yield between the 30,000, 33,000 and 36,000 seeds/acre seeding rates. There was a significant difference in plant stands taken at V2. Rainfall was average throughout the growing season, with a large t-storm in mid June causing significant variability across the trial and severe reductions in yield potential.

MCA would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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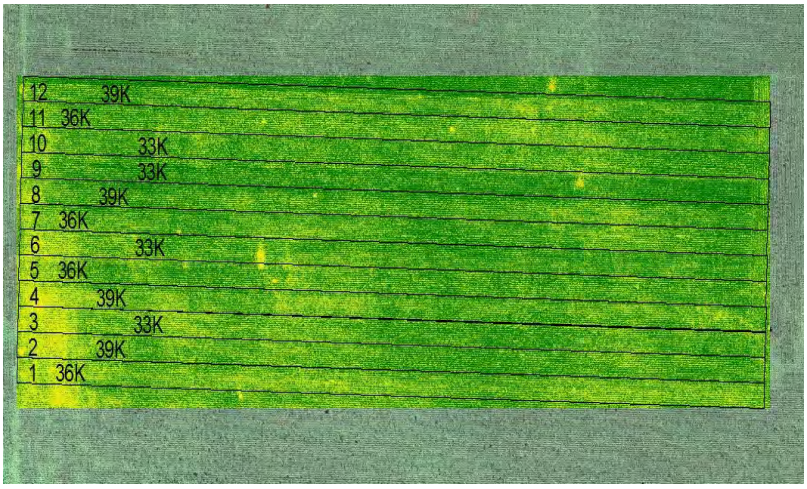
Corn Seed Rate

Trial ID: 2020-CRNP04 — R.M. of Wallace-Woodworth

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate by 3,000 seeds/ac in corn.

TRIAL INFORMATION	
Location	Virden
Previous Crop	Canola
Soil Texture	Fine Loam
Tillage	Conventional
Planting Date	May 07, 2020
Fertilizer (N-P-K-S)	150N 24P
Variety	P7211HR
Row Spacing	30”
Seed Rate (seeds/ac)	36k vs 33k vs 39k
Harvest Date	October 15, 2020

FIELD IMAGE—AUG 21, 2020



SOIL PROPERTIES†

N 0-24”	P (ppm)	K (ppm)	% O.M.
150	13	384	6.8

†Nutrient values measured at V2

PLANT STAND @ V2

Seed Rate (seeds/ac)	33,000	36,000	39,000
Plant stand/ac	23,500^{B}	29,250^{A}	31,250^{A}

PRECIPITATION†

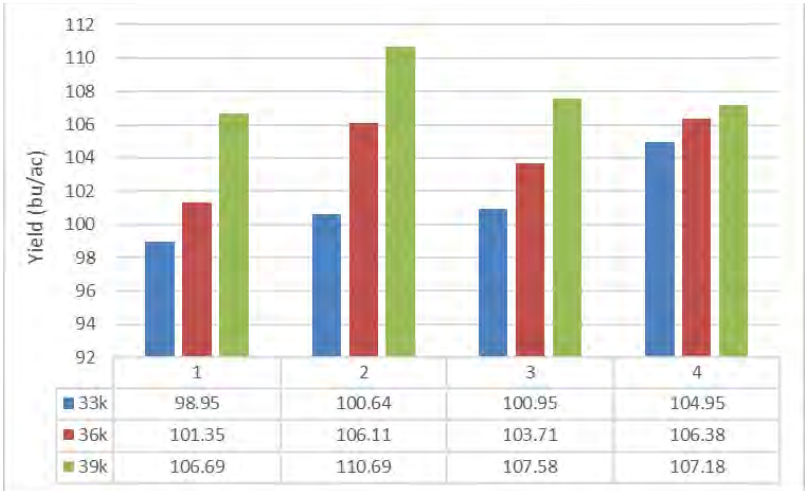
	May	June	July	Aug	Total
Rainfall	17	61	108	44	**230**
Normal	49	71	62	63	**245**

†Growing season precipitation (mm)

OVERALL YIELD

	Mean (bu/ac)
33,000 seeds/ac	101.4^{C}
36,000 seeds/ac	104.4^{B}
39,000 seeds/ac	108.1^{A}
P-Value	0.0046
CV	3.35%
Significance	**Yes**

STRIP YIELD



Summary: There was a significant difference in yield and plant stands at V2 between the 33,000, 36,000 and 39,000 seeds/acre seeding rates. It should be noted that plant stands at V2 were significantly below target due to seeding into cold, dry soil and minimal rainfall two weeks after emergence. Overall, rainfall was slightly below average throughout the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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Corn Seed Rate

Trial ID: 2020-CRNP05 — R.M. of De Salaberry

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate by 3,000 seeds/ac in corn.

TRIAL INFORMATION	
Location	Otterburne
Previous Crop	Canola
Soil Texture	Clay
Tillage	Conventional
Planting Date	May 16, 2020
Fertilizer (N-P-K-S)	Swine Manure - Fall 2019
Variety	P7861YHR
Row Spacing	22”
Seed Rate (seeds/ac)	33k vs 30k vs 36k
Harvest Date	October 15, 2020

SOIL PROPERTIES†

N 0-24”	P (ppm)	K (ppm)	% O.M.
110	54	295	5.5

†Nutrient values prior to spring seeding

PLANT STAND @ V2

Seed Rate (seeds/ac)	30,000	33,000	36,000
Plant stand/ac	27,250	29,750	28,250

PRECIPITATION†

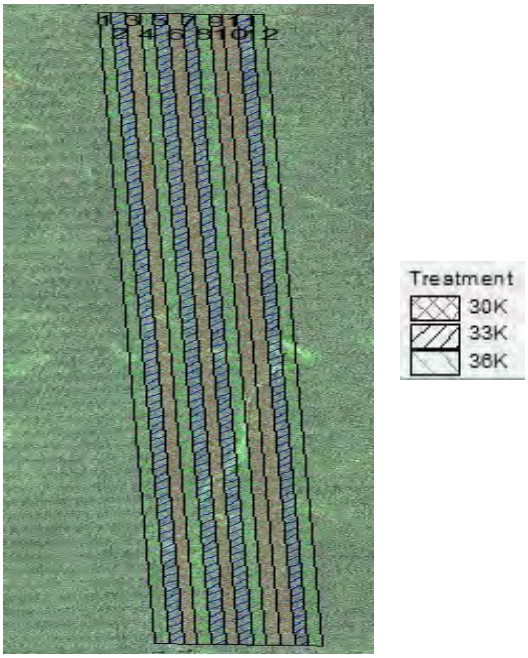
	May	June	July	Aug	Total
Rainfall	15	105	102	68	**290**
Normal	56	90	61	61	**269**

†Growing season precipitation (mm)

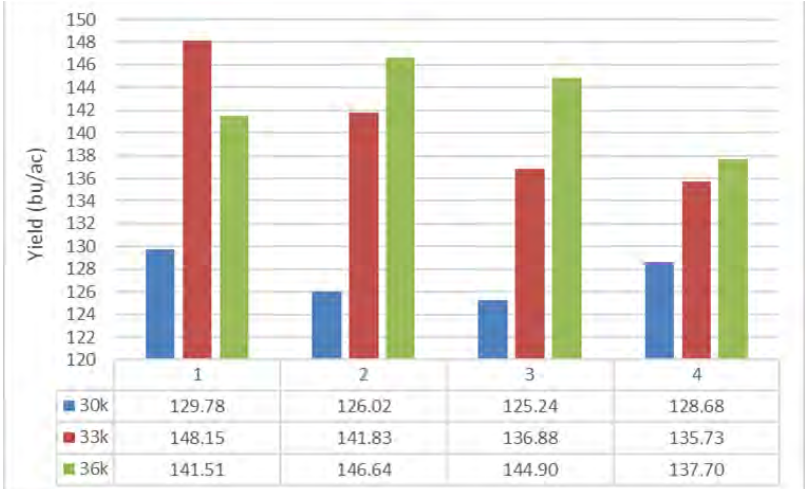
OVERALL YIELD

	Mean (bu/ac)
30,000 seeds/ac	127.4[B]
33,000 seeds/ac	140.7[A]
36,000 seeds/ac	142.7[A]
P-Value	0.00341
CV	5.85%
Significance	Yes

FIELD IMAGE—AUG 19, 2020



STRIP YIELD



Summary: There was a significant difference in yield between the 33,000 and 36,000 versus the 30,000 seeds/acre seeding rates. It should be noted that plant stands at V2 showed no significant difference between the three seeding rates. Overall, rainfall was slightly above average for the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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Corn Seed Rate

Trial ID: 2020-CRNP06 — R.M. of Rhineland

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate by 3,000 seeds/ac in corn.

TRIAL INFORMATION	
Location	Plum Coulee
Previous Crop	Dry Beans
Soil Texture	Fine Loam
Tillage	Conventional
Planting Date	May 15, 2020
Fertilizer (N-P-K-S)	160N 12P 10S
Variety	9212-10
Row Spacing	10”
Seed Rate (seeds/ac)	42k vs 39k vs 45k
Harvest Date	October 15, 2020

SOIL PROPERTIES†			
N 0-24”	**P (ppm)**	**K (ppm)**	**% O.M.**
253	42	265	3.3

†Nutrient values measured at V2

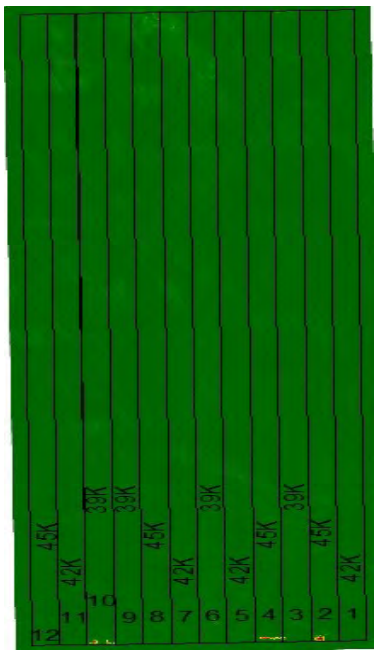
PLANT STAND @ V2			
Seed Rate (seeds/ac)	39,000	42,000	45,000
Plant stand/ac	36,500^{B}	40,250^{A}	42,000^{A}

PRECIPITATION†					
	May	**June**	**July**	**Aug**	**Total**
Rainfall	31	48	108	35	**222**
Normal	63	90	63	73	**288**

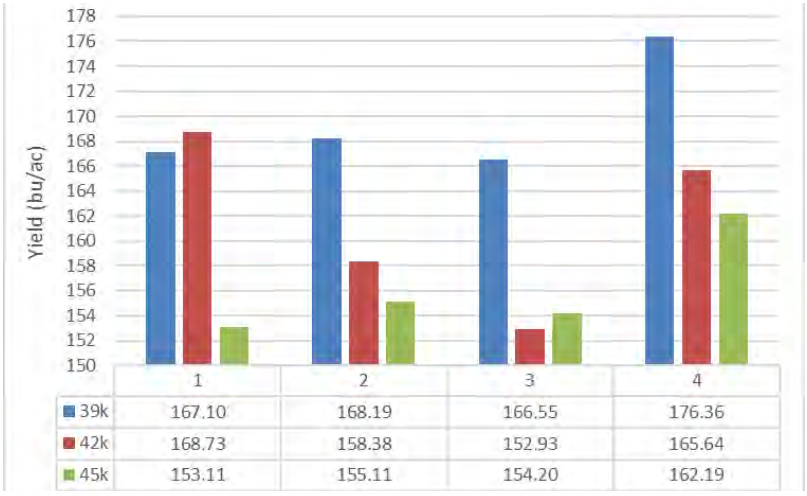
†Growing season precipitation (mm)

OVERALL YIELD	
	Mean (bu/ac)
39,000 seeds/ac	169.6^{A}
42,000 seeds/ac	161.4^{B}
45,000 seeds/ac	156.2^{B}
P-Value	0.00955
CV	2.49%
Significance	**Yes**

FIELD IMAGE - AUG 17, 2020



STRIP YIELD



Summary: There was a significant difference in yield between the 39,000 and the 42,000 and 45,000 seeds/acre seeding rates. There was a statistical difference in plant stands taken at V2. Overall, rainfall was below average throughout the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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Corn Seed Rate

Trial ID: 2020-CRNP07 — R.M. of Stanley

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate by 3,000 seeds/ac in corn. This trial also as a VR seeding rate component as well.

TRIAL INFORMATION	
Location	Winkler
Previous Crop	Potato
Soil Texture	Clay Loams
Tillage	Conventional
Planting Date	May 16, 2020
Fertilizer (N-P-K-S)	109N 64P 70K
Variety	DKC35-88RIB
Row Spacing	30”
Seed Rate (seeds/ac)	34.4k vs 31.4k vs 37.4k vs 32-35k VR
Harvest Date	October 16, 2020

SOIL PROPERTIES†

N 0-24”	P (ppm)	K (ppm)	% O.M.
131	15	186	3.1

†Nutrient values taken after spring seeding at V2

PLANT STAND @ V2

Seed Rate (seeds/ac)	31.4k	34.4k	37.4k	32-35k
Plant stand/ac	30.3k^{C}	34.5k^{B}	36.8k^{A}	33.8k^{B}

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	10	36	44	65	**155**
Normal	52	77	63	76	**267**

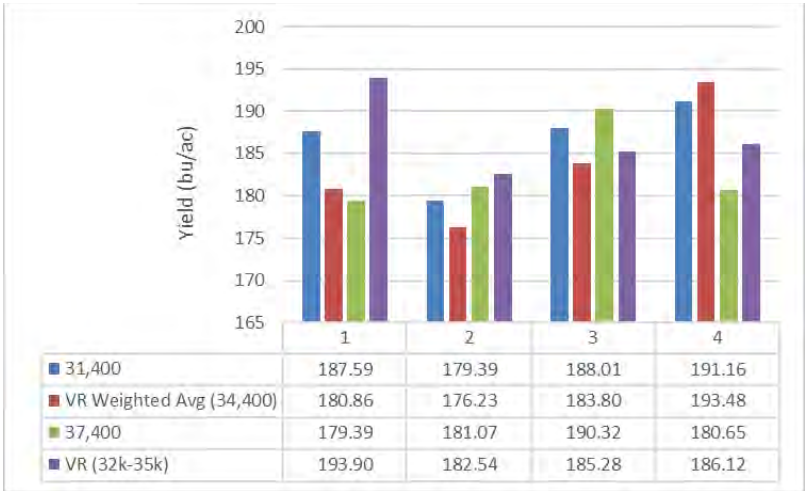
†Growing season precipitation (mm)

OVERALL YIELD

	Mean (bu/ac)
31,400 seeds/ac	186.6^{A}
34,400 seeds/ac	183.6^{A}
37,400 seeds/ac	182.9^{A}
32,000-35,000 VR	187.0^{A}
P-Value	0.589
CV	2.91%
Significance	No

FIELD IMAGE - AUG 17, 2020

STRIP YIELD



Summary: There was no significant difference in yield between the four seeding rate treatments. There was a significant difference in plant stands taken at V2. Overall, rainfall was well below average for the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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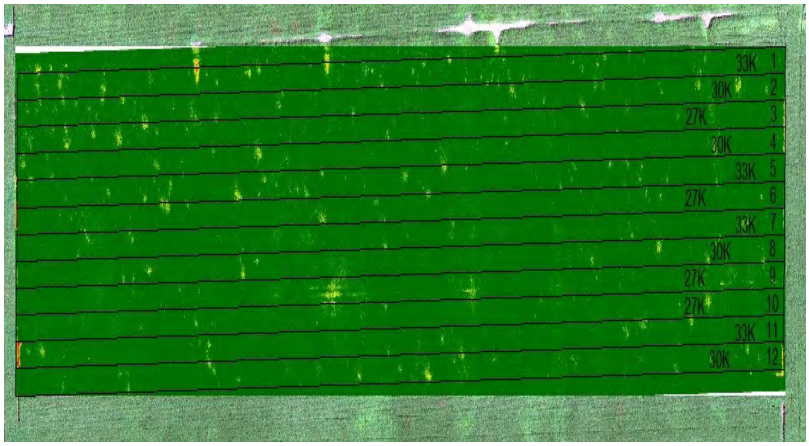
Corn Seed Rate

Trial ID: 2020-CRNP08 — R.M. of De Salaberry

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate by 3,000 seeds/ac in corn.

TRIAL INFORMATION	
Location	St. Pierre
Previous Crop	Soybeans
Soil Texture	Clay
Tillage	Conventional
Planting Date	May 17, 2020
Fertilizer (N-P-K-S)	Swine Manure - Fall 2019
Variety	P7453R
Row Spacing	22”
Seed Rate (seeds/ac)	30k vs 27k vs 34k
Harvest Date	October 13, 2020

FIELD IMAGE - AUG 19, 2020



SOIL PROPERTIES†

N 0-24”	P (ppm)	K (ppm)	% O.M.
298	82	519	6.0

†Nutrient values prior to spring seeding

PLANT STAND @ V2

Seed Rate (seeds/ac)	27,000	30,000	34,000
Plant stand/ac	23,500^{B}	24,740^{B}	28,250^{A}

PRECIPITATION†

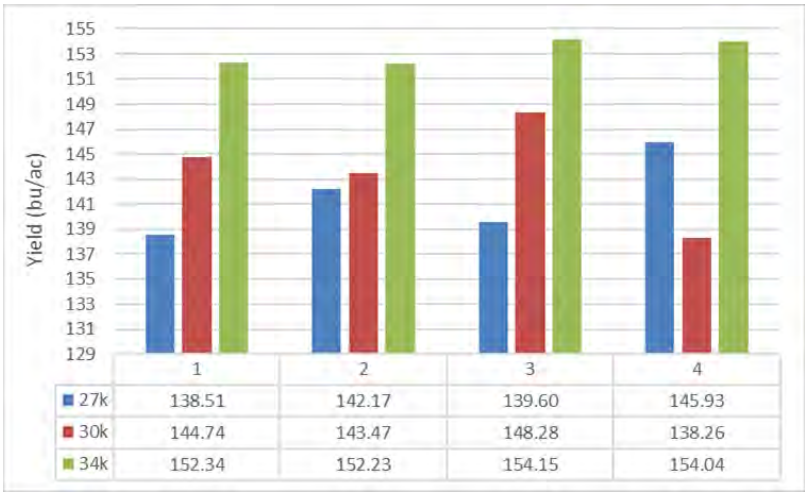
	May	June	July	Aug	Total
Rainfall	15	105	102	68	**290**
Normal	56	90	61	61	**269**

†Growing season precipitation (mm)

OVERALL YIELD

	Mean (bu/ac)
27,000 seeds/ac	141.6^{A}
30,000 seeds/ac	143.7^{A}
34,000 seeds/ac	153.2^{B}
P-Value	0.00897
CV	4.10%
Significance	**Yes**

STRIP YIELD



Summary: There was a significant difference in yield between the 34,000 seeds/acre seeding rate versus the 30,000 and 27,000 seeds/ acre seeding rates. There was a significant difference in plant stands taken at V2. Overall, rainfall was slightly above average for the growing season, with a hail storm occurring at V2 (see NDVI image above).

MCA would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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Corn Seed Rate

Trial ID: 2020-CRNP09 — R.M. of Dufferin

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate by 3,000 seeds/ac in corn.

TRIAL INFORMATION	
Location	Carman
Previous Crop	Wheat
Soil Texture	Fine Loam
Tillage	Conventional
Planting Date	May 19, 2020
Fertilizer (N-P-K-S)	140N 40P 40K 10S
Variety	A4939G2 R9B
Row Spacing	20”
Seed Rate (seeds/ac)	34k vs 31k vs 37k
Harvest Date	October 12, 2020

SOIL PROPERTIES†

N 0-24”	P (ppm)	K (ppm)	% O.M.
79	9	109	2.0

†Nutrient values measured at V2

PLANT STAND @ V2

Seed Rate (seeds/ac)	31,000	34,000	37,000
Plant stand/ac	32,250^{B}	34,000^{AB}	36,250^{A}

PRECIPITATION†

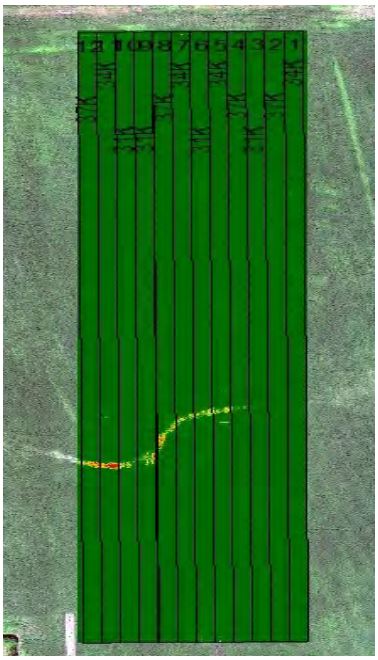
	May	June	July	Aug	Total
Rainfall	30	47	81	27	**184**
Normal	55	78	59	79	**271**

†Growing season precipitation (mm)

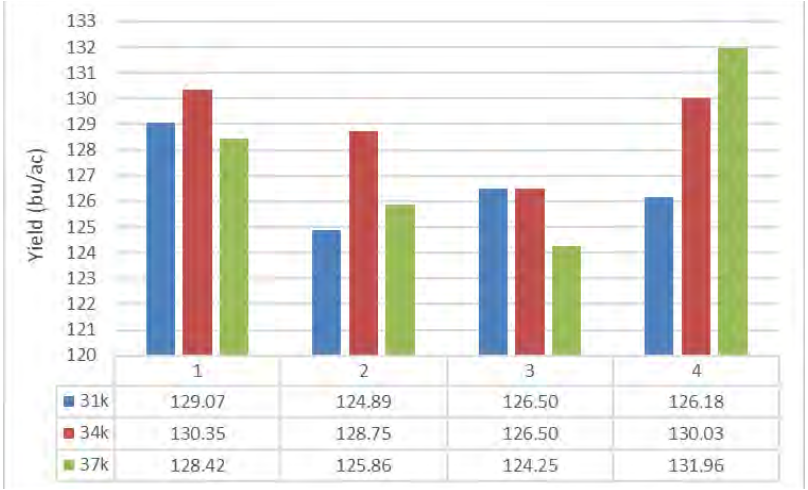
OVERALL YIELD

	Mean (bu/ac)
31,000 seeds/ac	126.7^{A}
34,000 seeds/ac	128.9^{A}
37,000 seeds/ac	127.7^{A}
P-Value	0.298
CV	1.87%
Significance	No

FIELD IMAGE - AUG 18, 2020



STRIP YIELD



Summary: There was no significant difference in yield between the 31,000, 34,000 and 37,000 seeds/acre seeding rates. There was a significant difference between plant stands taken at V2. Overall, rainfall was well below average for the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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Corn Seed Rate

Trial ID: 2020-CRNP10 — R.M. of Hanover

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate by 3,000 seeds/ac in corn.

TRIAL INFORMATION	
Location	Niverville
Previous Crop	Soybeans
Soil Texture	Clay
Tillage	Conventional
Planting Date	May 19, 2020
Fertilizer (N-P-K-S)	161N
Variety	P7527AM
Row Spacing	22”
Seed Rate (seeds/ac)	34.7k vs 31.7k vs 37.7k
Harvest Date	October 17, 2020

SOIL PROPERTIES†

N 0-24”	P (ppm)	K (ppm)	% O.M.
259	37	355	6.6

†Nutrient values measured at V2

PLANT STAND @ V2

Seed Rate (seeds/ac)	31,660	34,660	37,660
Plant stand/ac	30,250[B]	34,000[A]	36,750[A]

PRECIPITATION†

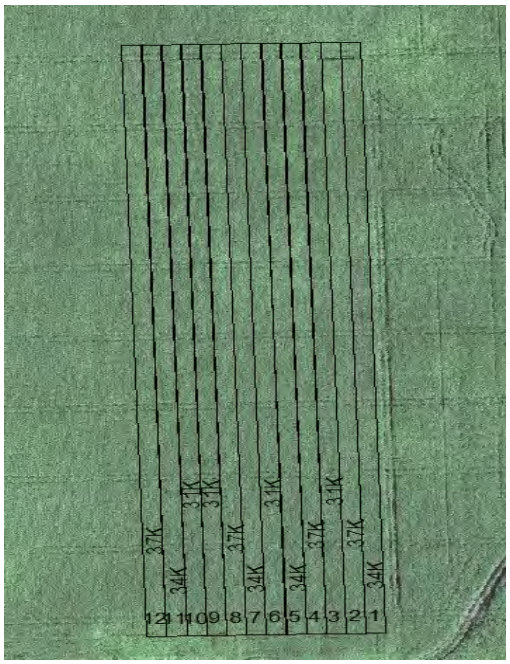
	May	June	July	Aug	Total
Rainfall	15	105	102	68	**290**
Normal	56	90	61	61	**269**

†Growing season precipitation (mm)

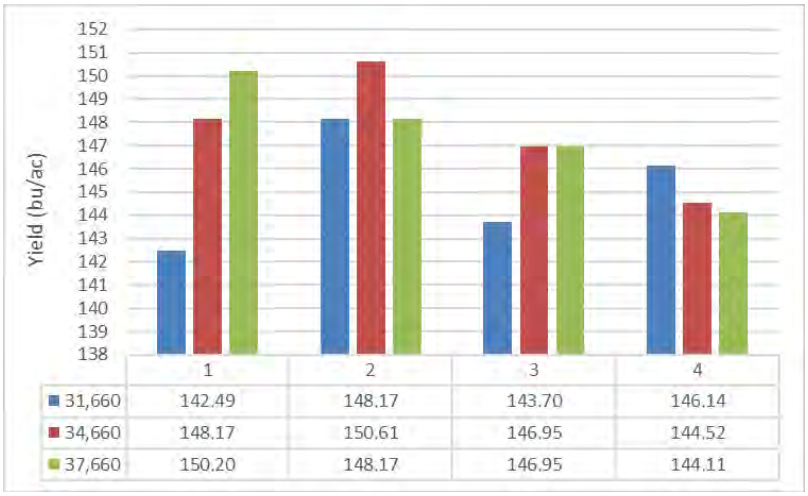
OVERALL YIELD

	Mean (bu/ac)
31,660 seeds/ac	145.1[A]
34,660 seeds/ac	147.6[A]
37,660 seeds/ac	147.4[A]
P-Value	0.311
CV	1.75%
Significance	No

FIELD IMAGE - AUG 19, 2020



STRIP YIELD



	1	2	3	4
31,660	142.49	148.17	143.70	146.14
34,660	148.17	150.61	146.95	144.52
37,660	150.20	148.17	146.95	144.11

Summary: There was no significant difference in yield between the 31,000, 34,000 and 37,000 seeds/acre seeding rates. There was a significant difference in plant stands taken at V2. Overall, rainfall was slightly above average for the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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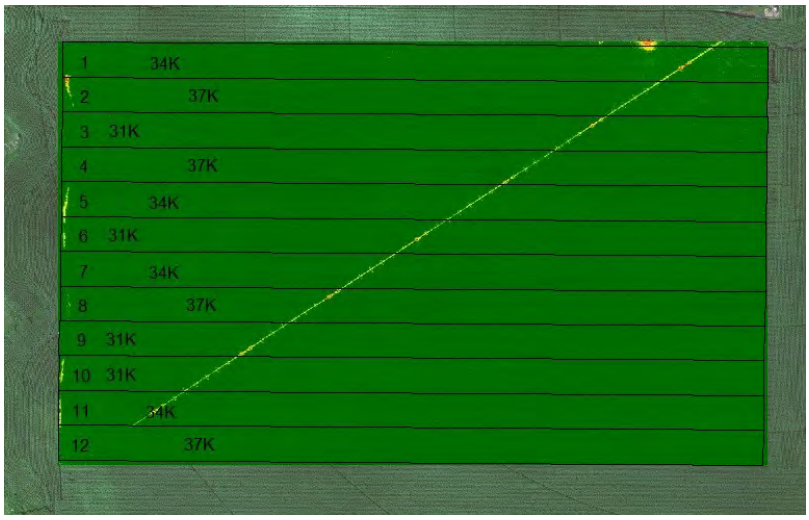
Corn Seed Rate

Trial ID: 2020-CRNP11 — R.M. of Glenboro-South Cypress

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate by 3,000 seeds/ac in corn.

TRIAL INFORMATION	
Location	Glenboro
Previous Crop	Potato
Soil Texture	Coarse Loam
Tillage	Conventional
Planting Date	May 22, 2020
Fertilizer (N-P-K-S)	
Variety	P7227R
Row Spacing	30”
Seed Rate (seeds/ac)	34k vs 31k vs 37k
Harvest Date	October 13, 2020

FIELD IMAGE - AUG 15, 2020



SOIL PROPERTIES†

N 0-24”	P (ppm)	K (ppm)	% O.M.
305	32	312	3.0

†Nutrient values measured at V2

PLANT STAND @ V2

Seed Rate (seeds/ac)	31,000	34,000	37,000
Plant stand/ac	27,500^{C}	29,750^{B}	32,250^{A}

PRECIPITATION†

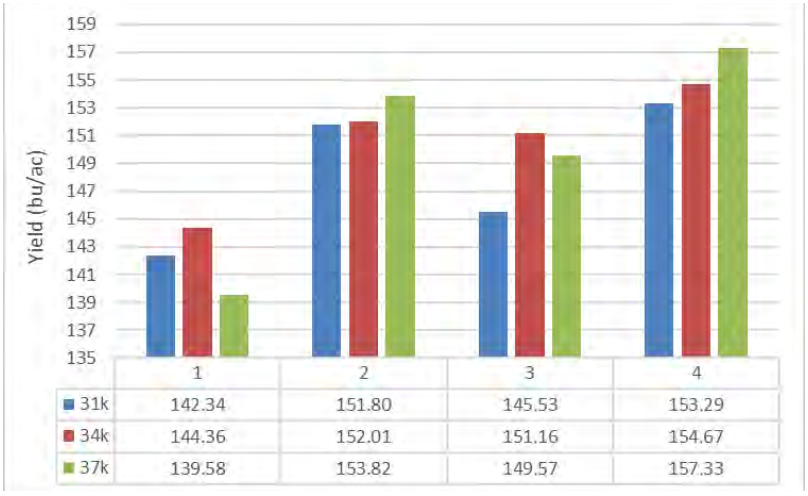
	May	June	July	Aug	Total
Rainfall	10	36	44	65	**155**
Normal	52	77	63	76	**267**

†Growing season precipitation (mm)

OVERALL YIELD

	Mean (bu/ac)
31,000 seeds/ac	148.2^{A}
34,000 seeds/ac	150.6^{A}
37,000 seeds/ac	150.1^{A}
P-Value	0.33825
CV	3.65%
Significance	No

STRIP YIELD



Summary: There was no significant difference in yield between the 31,000, 34,000 and 37,000 seeds/acre seeding rates. There was a significant difference in plant stands taken at V2. Overall, rainfall was well below average across the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support for this trial.

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Wheat Biological Trial

Objective: The purpose of this project is to quantify the agronomic and economic impacts of using a biological stimulant in wheat.

Summary: There was no significant difference in yield using a biological stimulant in any of the 5 trials.

Trial ID	Rural Municipality	Seeding Date	Product	Yield			CV	P-Value	Statistically Significant @ 95%
				On-Seed	Foliar	Untreated			
				bu/ac			%		
2020-WB01	MacDonald	May 9	Crop Aid Plus	51.9	52.6	52.2	4.0	0.9060	No

Trial ID	Rural Municipality	Seeding Date	Product	Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
				Treated	Untreated				
				bu/ac		bu/ac	%		
2020-WB02	De Salaberry	May 12	SumaGrow	53.3	54.8	-1.5	4.2	0.5160	No
2020-WB03	Glenboro-South Cypress	May 16	Vitazyme	73.6	71.6	2.0	8.6	0.6350	No
2020-WB04	Brokenhead	May 19	Crop Aid Plus	50.0	50.7	-0.7	5.0	0.5600	No
2020-WB05	North Cypress-Langford	May 20	Lignijoule	65.5	70.3	-4.8	6.8	0.1960	No

Indicates Statistical Difference at 95% confidence interval

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Wheat Biological

Trial ID: 2020-WB01 — R.M. of MacDonald

Objective: The purpose of this project is to quantify the impacts of using a biological stimulant in wheat.

TRIAL INFORMATION	
Location	Starbuck
Previous Crop	Soybeans
Soil Texture	Clay
Tillage	Conventional
Planting Date	May 09, 2020
Variety	AAC Brandon
Row Spacing	7.5”
Seeding Rate	115 lbs/ac
Fertilizer (N-P-K-S)	127N 31P
Biological Product	Crop Aid Plus
Application Date	May 09 & June 12, 2020
Application Timing	On-seed & 4L
Harvest Date	August 26, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	72	44	90	40	**244**
Normal	61	87	57	93	**298**

†Growing season precipitation (mm)

WHEAT RESPONSE

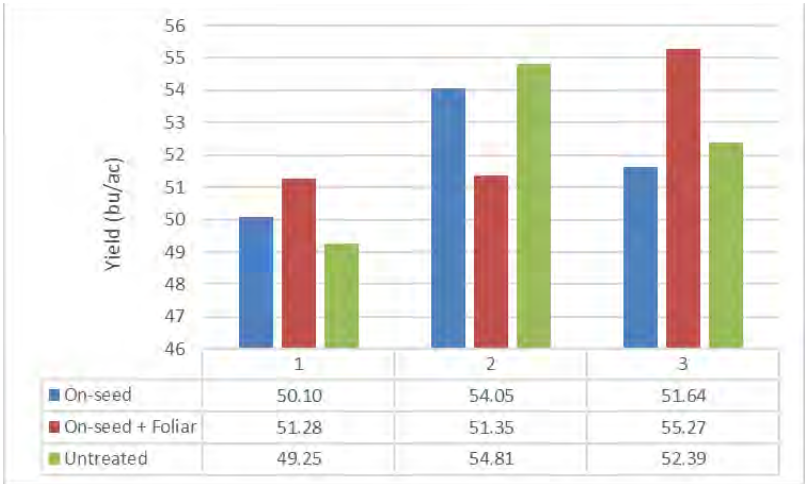
	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
On-seed	9[A]	13.3	81	340
On-seed + Foliar	9[A]	13.7	81	332
Untreated	13[A]	13.3	81	347

OVERALL YIELD

	Mean (bu/ac)
On-seed	51.9[A]
On-seed + Foliar	52.6[A]
Untreated	52.2[A]
P-Value	0.906
CV	3.99%
Significance	No

FIELD IMAGE

STRIP YIELD



Summary: There was no significant yield differences between the biological product applications versus the untreated check. Wheat quality was #1 grade for CWRS. Plant stand counts were below normal due to poor emergence and heavy rainfall early in growing season. Rainfall was below normal for the entire growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Biological

Trial ID: 2020-WB02 — R.M. of De Salaberry

Objective: The purpose of this project is to quantify the impacts of using a biological stimulant in wheat.

TRIAL INFORMATION	
Location	Grunthal
Previous Crop	Barley
Soil Texture	Clay
Tillage	Conventional
Planting Date	May 12, 2020
Variety	AAC Brandon
Row Spacing	10”
Seeding Rate	198 lbs/ac
Fertilizer (N-P-K-S)	100N 20P
Biological Product	SumaGrow
Application Date	June 01, 2020
Application Timing	2L
Harvest Date	August 18, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	15	105	102	68	**290**
Normal	56	90	61	61	**269**

†Growing season precipitation (mm)

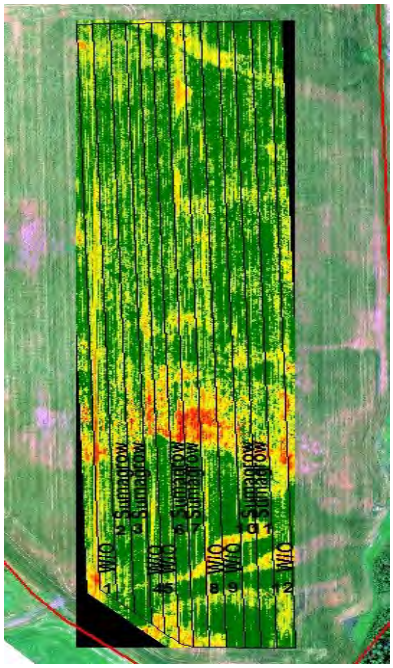
WHEAT RESPONSE

	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
Treated	18[A]	14.1	80	345
Untreated	18[A]	14.3	80	357

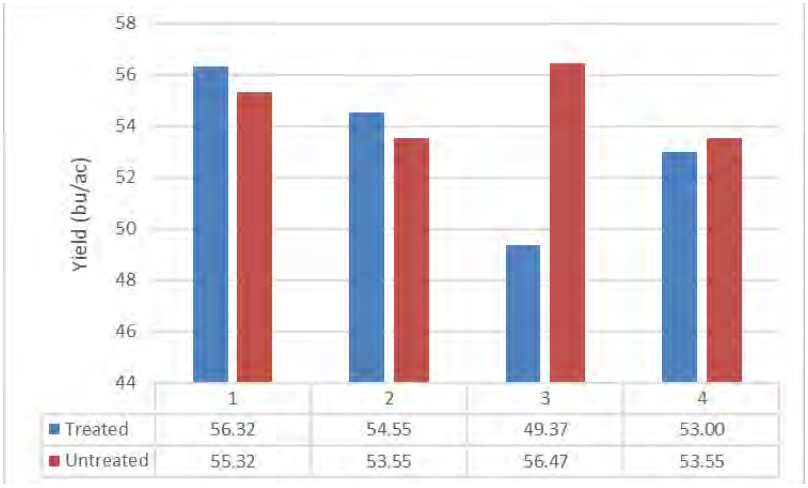
OVERALL YIELD

	Mean (bu/ac)
Treated	53.3[A]
Untreated	54.8[A]
Difference	-1.5
P-Value	0.516
CV	4.22%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant yield difference between the biological product application versus the untreated check. Wheat quality was #2 grade CWRS for both treatments due to low HVK % (< 60% Hard Vitreous Kernels). Rainfall was above normal for the entire growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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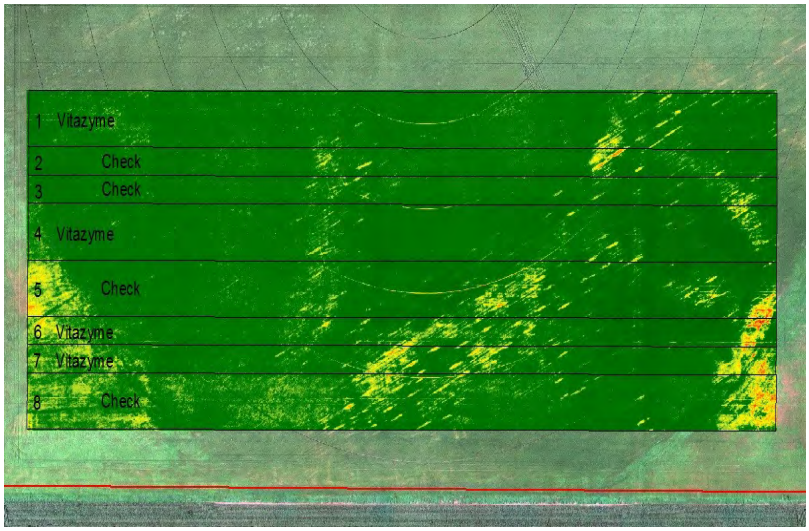
Wheat Biological

Trial ID: 2020-WB03 — R.M. of Glenboro-South Cypress

Objective: The purpose of this project is to quantify the impacts of using a biological stimulant in wheat.

TRIAL INFORMATION	
Location	Cypress River
Previous Crop	Potato
Soil Texture	Course Loams
Tillage	Conventional
Planting Date	May 16, 2020
Variety	AAC Brandon
Row Spacing	7.5”
Seeding Rate	90 lbs/ac
Fertilizer (N-P-K-S)	100N
Biological Product	Vitazyme
Application Date	June 11, 2020
Application Timing	4L
Harvest Date	August 26, 2020

FIELD IMAGE



PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	11	36	162	45	**254**
Normal	54	78	68	74	**273**

†Growing season precipitation (mm)

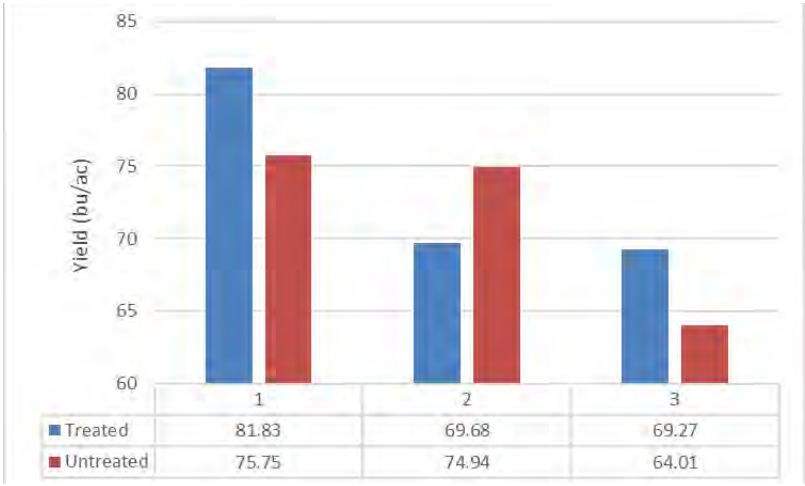
WHEAT RESPONSE

	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
Treated	—	14.9	79	302
Untreated	—	15.5	78	300

OVERALL YIELD

	Mean (bu/ac)
Treated	73.6[A]
Untreated	71.6[A]
Difference	2.0
P-Value	0.635
CV	8.59%
Significance	No

STRIP YIELD



Summary: There was no significant yield difference between the biological product versus the untreated check. Wheat quality for both treatments was tough #1 grade for CWRS (high moisture). Rainfall was below normal for May, June and August and well above normal for July.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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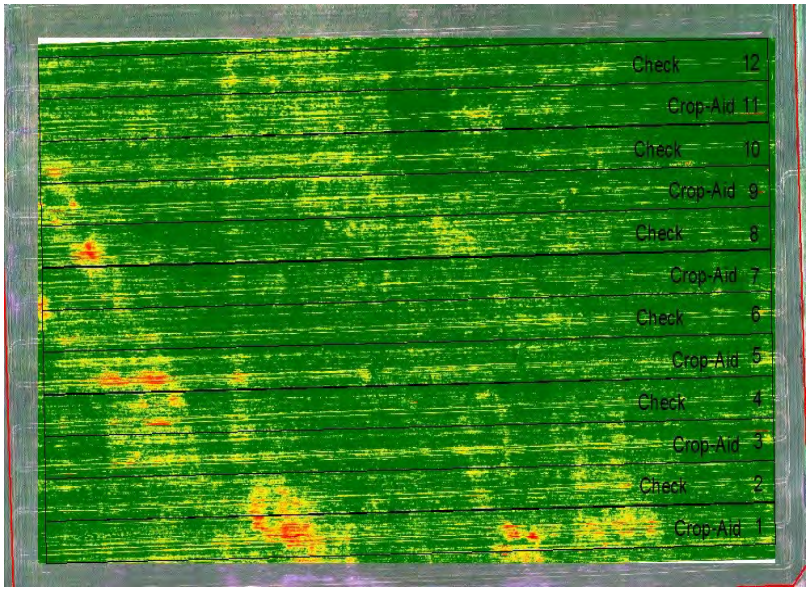
Wheat Biological

Trial ID: 2020-WB04 — R.M. of Brokenhead

Objective: The purpose of this project is to quantify the impacts of using a biological stimulant in wheat.

TRIAL INFORMATION	
Location	Beausejour
Previous Crop	Soybeans
Soil Texture	Clay Loams
Tillage	Minimal Tillage
Planting Date	May 19, 2020
Variety	AC Carberry
Row Spacing	9”
Seeding Rate	120 lbs/ac
Fertilizer (N-P-K-S)	101N 52P 60K
Biological Product	Crop Aid Plus
Application Date	June 24, 2020
Application Timing	5L
Harvest Date	September 15, 2020

FIELD IMAGE



PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	11	75	44	117	**247**
Normal	57	85	68	81	**290**

†Growing season precipitation (mm)

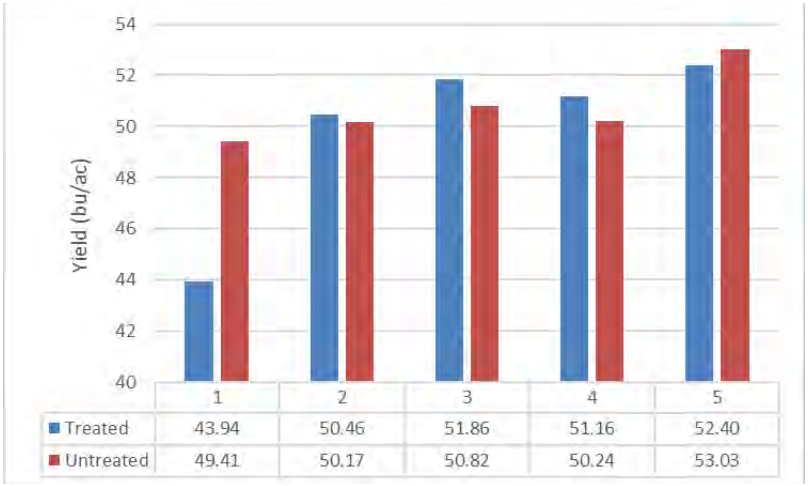
WHEAT RESPONSE

	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
Treated	—	12.4	80	333
Untreated	—	12.6	80	329

OVERALL YIELD

	Mean (bu/ac)
Treated	50.0[A]
Untreated	50.7[A]
Difference	-0.7
P-Value	0.56
CV	4.98%
Significance	No

STRIP YIELD



Summary: There was no significant yield difference between the biological product application versus the untreated check. This product was also used on the same parts of the field in 2019 on soybeans (no statistical difference) as part of a multi-year study. Wheat quality was #2 grade for CWRS. Rainfall was below normal for the entire growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Biological

Trial ID: 2020-WB05 — R.M. of North Cypress-Langford

Objective: The purpose of this project is to quantify the impacts of using a biological stimulant in wheat.

TRIAL INFORMATION	
Location	Carberry
Previous Crop	Canola
Soil Texture	Clay Loam
Tillage	Zero Tillage
Planting Date	May 20, 2020
Variety	AAC Brandon
Row Spacing	10”
Seeding Rate	105 lbs/ac
Fertilizer (N-P-K-S)	99N
Biological Product	Lignijoule
Application Date	May 20, 2020
Application Timing	Seeding
Harvest Date	September 06, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	9	44	112	77	**242**
Normal	54	66	72	103	**295**

†Growing season precipitation (mm)

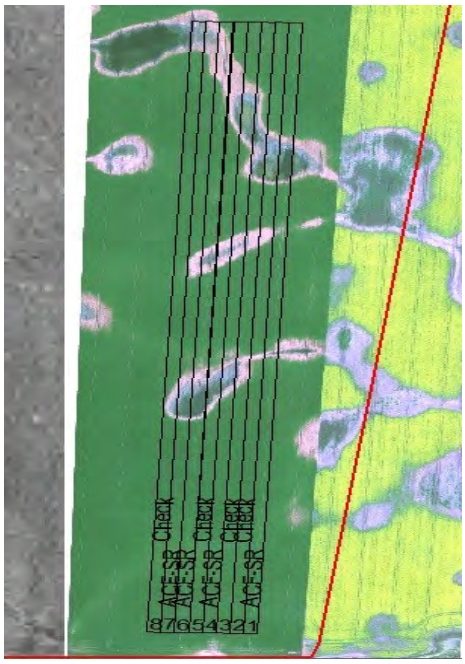
WHEAT RESPONSE

	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
Treated	28[A]	13.1	79	340
Untreated	25[A]	13.5	80	328

OVERALL YIELD

	Mean (bu/ac)
Treated	65.5[A]
Untreated	70.3[A]
Difference	-4.8
P-Value	0.196
CV	6.83%
Significance	No

FIELD IMAGE



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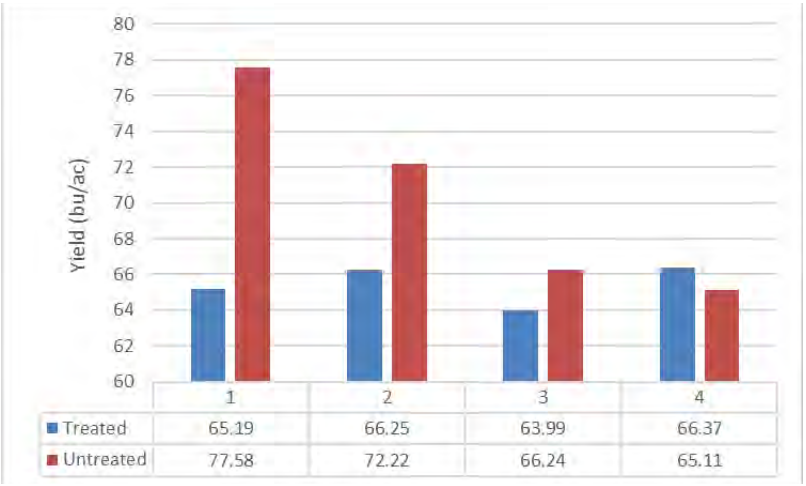

Summary: There was no significant yield difference between the biological product application and the untreated check. Wheat quality was #1 grade for the biological treatment and #2 grade for the untreated check (due to HVK % below threshold). Rainfall was variable, with very little precipitation in May and June and excess in July.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Fusarium Fungicide Trial

Objective: The purpose of the first project (Table 1) is to quantify the impact of fusarium head blight on the quality of harvested grain (Table 2) by comparing a farmer's normal fungicide application at recommended timing to a fungicide application 3-5 days later. The purpose of the second project (Table 3) was to compare the use of a biological product EcoTea Foliar "HDI" versus fungicide to control fusarium head blight.

Summary:

Table 1: 3 site-years had a significant yield increase with fusarium fungicide application; both the recommended and late timing increased wheat yield above the control, but the two timings did not significantly differ from one another. Of the 17 site-years between 2018-2020 there were 5 site-years that showed a significant difference in yield.

Table 3: There was a significant yield difference using a fusarium fungicide versus a biological product.

Table 1: Fusarium Fungicide Timing

Trial ID	Rural Municipality	Variety	Yield			CV	P-Value	Statistically Significant @ 95%
			Late	Rec'd	Untreated			
			bu/ac			%		
2020-WFHB02	Roland	SY Rowyn	92.5	94.0	91.1	4.5	0.0037	Yes
2020-WFHB03	Grey	AAC Brandon	85.5	85.4		3.2	0.9420	No
2020-WFHB04	Grey	AC Cardale	74.7^{A}	71.3^{B}	72.7^{AB}	3.1	0.0443	Yes
2020-WFHB05	Morris	AAC Brandon	75.0	74.7		4.2	0.8920	No
2020-WFHB06	Brokenhead	AAC Brandon	78.6	79.9	75.3	2.9	0.0006	Yes
2020-WFHB07	Cartwright-Roblin	AAC Brandon	52.8	51.6	47.4	5.6	0.4890	No
2019-WFHB01	Westlake-Gladstone	AAC Brandon	57.9	59.5	56.5	5.1	0.1461	No
2019-WFHB02	St. Francois Xavier	AAC Brandon	98.9	100.5	104.0	4.5	0.6582	No
2019-WFHB03	MacDonald	AAC Brandon	54.0	53.9	49.7	7.3	0.0025	Yes
2019-WFHB04	St. Clements	SY Rowyn	72.9	74.4	71.5	4.0	0.0886	No
2019-WFHB05	Dauphin	AAC Viewfield	76.9	81.3	75.6	6.2	0.0874	No
2019-WFHB06	Wallace-Woodworth	AAC Brandon	80.3	79.6	78.0	2.2	0.1138	No
2019-WFHB07	Pembina	AAC Brandon	74.7	80.7	70.1	7.0	0.1478	No
2018-WFHB01	Morris	SY Rowyn	84.6^{A}	83.7^{AB}	80.8^{B}	2.8	0.0382	Yes
2018-WFHB02	Louise	AAC Brandon	87.5	86.2	84.4	5.6	0.3459	No
2018-WFHB03	Dufferin	AAC Brandon	60.8	58.4		3.4	0.1627	No
2018-WFHB04	Grey	AAC Brandon	65.0	64.9	62.5	3.4	0.3277	No

Indicates Statistical Difference at 95% confidence interval

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Table 2: Quality Analysis

TrialID	Treatment	Protein	Don	Falling Number	TWT (lbs/bu)
2018-WFHB01	Recommended	14.4	< 0.3	> 360	66
	Late	14.5	< 0.3	> 360	67
	Untreated	14.5	< 0.3	> 360	66
2018-WFHB02	Recommended	15.4	< 0.3	> 360	66
	Late	15.5	< 0.3	> 360	66
	Untreated	15.7	0.3	> 360	66
2018-WFHB03	Recommended	16.2	< 0.3	> 360	67
	Late	15.8	< 0.3	> 360	68
2018-WFHB04	Recommended	14.4	< 0.3	> 360	68
	Late	14.3	< 0.3	> 360	68
	Untreated	14.7	< 0.3	> 360	68
2019-WFHB01	Recommended	14.8	0.5	351	67
	Late	15.0	<0.3	344	67
	Untreated	14.8	<0.3	320	67
2019-WFHB02	Recommended	15.5	<0.3	325	66
	Late	15.2	<0.3	285	65
	Untreated	15.3	<0.3	345	64
2019-WFHB03	Recommended	14.5	<0.3	287	63
	Late	14.7	<0.3	294	63
	Untreated	14.6	<0.3	286	63
2019-WFHB04	Recommended	12.4	<0.3	295	63
	Late	12.4	<0.3	269	63
	Untreated	12.5	<0.3	284	63
2019-WFHB05	Recommended	12.2	<0.3	338	65
	Late	12.2	<0.3	336	65
	Untreated	12.2	<0.3	337	65
2019-WFHB06	Recommended	13.7	<0.3	317	64
	Late	13.6	<0.3	309	64
	Untreated	13.8	<0.3	291	63
2019-WFHB07	Recommended	13.0	0.3	225	61
	Late	12.9	0.3	239	60
	Untreated	11.8	0.4	233	59
2020-WFHB01	Prosaro XTR	12.8	< 0.3	339	79
	EcoTea Foliar "HDI"	12.8	< 0.3	345	80
2020-WFHB02	Recommended	13.7	<0.3	353	81
	Late	13.6	<0.3	352	81
	Untreated	13.9	<0.3	347	80
2020-WFHB03	Recommended	14.5	<0.3	349	81
	Late	14.6	<0.3	347	81
2020-WFHB04	Recommended	14.0	<0.3	354	77
	Late	13.8	<0.3	342	77
	Untreated	14.1	<0.3	349	77
2020-WFHB05	Recommended	13.5	<0.3	356	82
	Late	13.7	<0.3	350	81
2020-WFHB06	Recommended	13.4	<0.3	342	80
	Late	13.5	<0.3	349	80
	Untreated	13.5	<0.3	354	79
2020-WFHB07	Recommended	15.5	0.5	289	81
	Late	15.1	0.5	298	80
	Untreated (Reference)	15.1	0.5	325	80

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Wheat Fusarium Fungicide Trial cont'd

Table 3: Fusarium Fungicide vs. Biological Stimulant

Trial ID	Rural Municipality	Variety	Yield		Difference	CV	P-Value	Statistically Significant @ 95%
			EcoTea Foliar "HDI"	Prosaro XTR				
			bu/ac		bu/ac	%		
2020-WFHB01	Cartier	AAC Brandon	65.9	69.9	-4.0	4.3	0.0076	Yes

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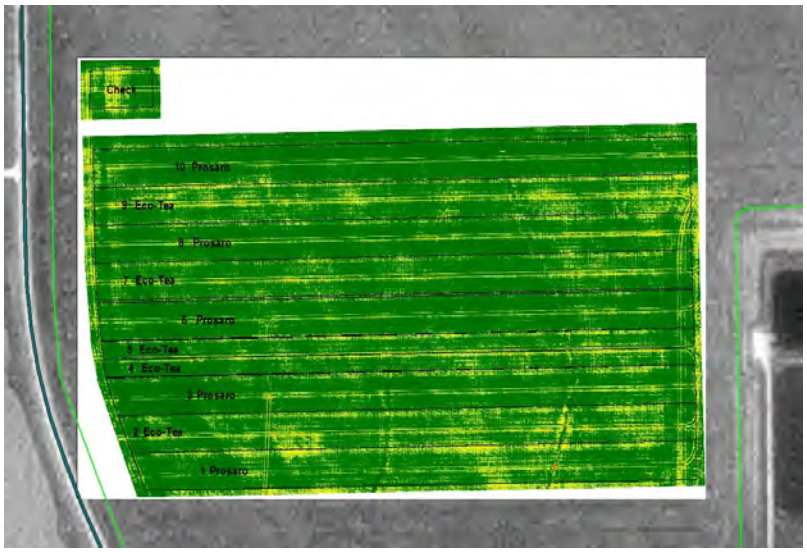
Wheat Fusarium Head Blight Fungicide vs. Biological

Trial ID: 2020-WFHB01 — R.M. of Cartier

Objective: The purpose of this project is to quantify the impact of fusarium head blight on the quality of harvested grain by comparing the farmer's normal fungicide application versus EcoTea Foliar "HDI" biological product.

TRIAL INFORMATION	
Location	Elie
Previous Crop	Soybeans
Soil Texture	Clay Loam
Tillage	Conventional
Planting Date	May 11, 2020
Variety	AAC Brandon
Row Spacing	7.5"
Seeding Rate	150 lbs/ac
Fungicide Product	Prosaro XTR
Biological Product	EcoTea Foliar "HDI"
Application Date	June 04, 2020
Application Timing	Early Flower
Harvest Date	August 18, 2020

FIELD IMAGE



PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	33	48	110	50	**240**
Normal	51	74	63	78	**267**

†Growing season precipitation (mm)

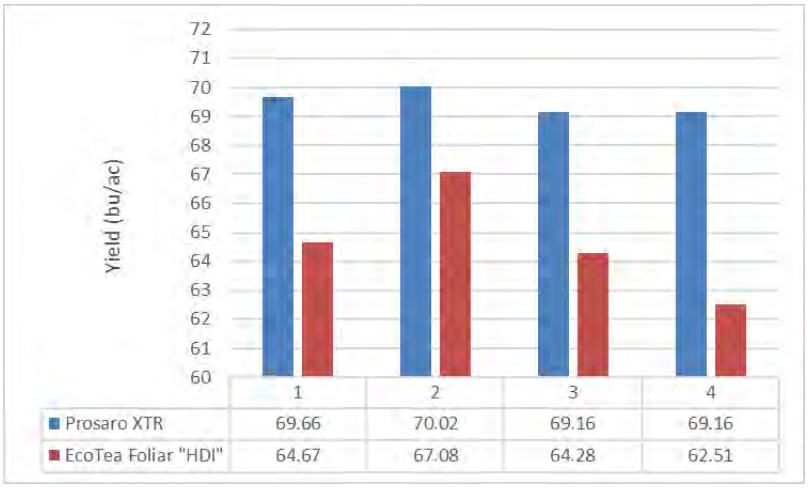
WHEAT QUALITY

	Protein	DON	TWT (kg/hL)	Falling Number
Prosaro XTR	12.8	0.1	79	339
EcoTea Foliar "HDI"	12.8	0.2	80	345

OVERALL YIELD

	Mean (bu/ac)
Prosaro XTR	69.9[A]
EcoTea Foliar "HDI"	65.9[B]
Difference	-4.0
P-Value	0.00763
CV	4.31%
Significance	Yes

STRIP YIELD



Summary: There was a significant yield difference between the Prosaro XTR and EcoTea Foliar products used for fusarium head blight fungicide timing applications. Wheat quality was #1 grade for CWRS with one sample down graded to #2 for mildew. Rainfall was slightly below normal for the entire growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Fusarium Head Blight Fungicide Timing

Trial ID: 2020-WFHB02 — R.M. of Roland

Objective: The purpose of this project is to quantify the impact of fusarium head blight on the quality of harvested grain by comparing the farmer's normal fungicide application at recommended rate and timing to a fungicide application 3 to 5 days later

TRIAL INFORMATION

Location	Roland
Previous Crop	Peas
Soil Texture	Course Loams
Tillage	Zero Tillage
Planting Date	May 12, 2020
Variety	SY Rowyn
Row Spacing	7.5"
Seeding Rate	140 lbs/ac
Fungicide Product	Prosaro XTR
Rec'd App Date	July 06, 2020
Rec'd App Timing	Early Flower
3-5 Days Later	July 10, 2020
Harvest Date	August 26, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	30	47	81	27	**184**
Normal	55	78	59	79	**271**

†Growing season precipitation (mm)

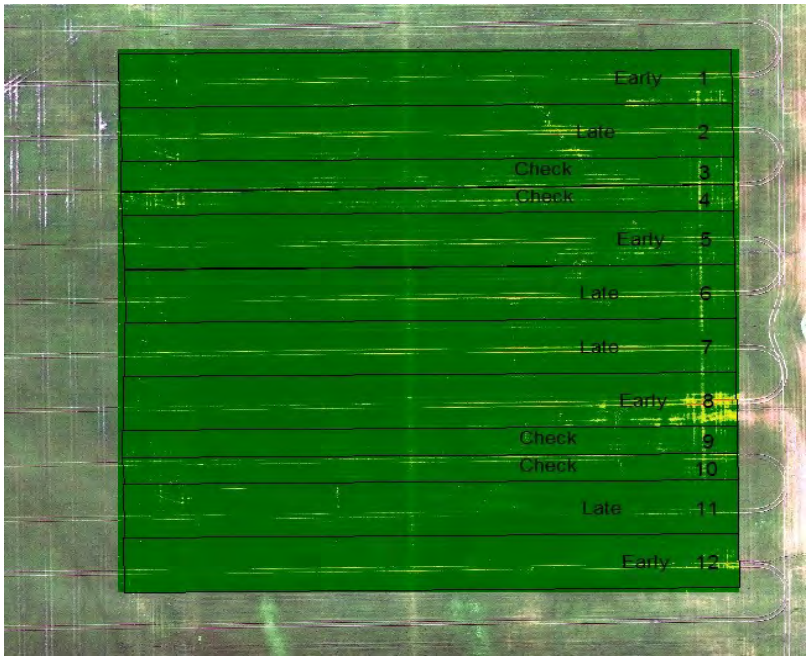
WHEAT QUALITY

	Protein	DON	TWT (kg/hL)	Falling Number
Rec'd Timing	13.7	0.0	81	353
Late Timing	13.6	0.0	81	352
Untreated	13.9	0.1	80	347

OVERALL YIELD

	Mean (bu/ac)
Rec'd Timing	94.0[A]
Late Timing	92.5[A]
Untreated	91.1[B]
P-Value	0.00365
CV	4.5%
Significance	Yes

FIELD IMAGE



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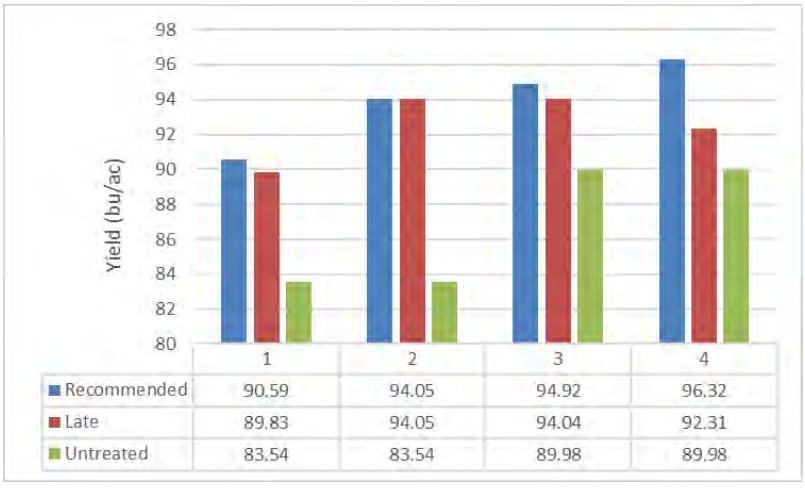

Summary: There was a significant yield difference between the recommended and late timing versus the untreated check for fusarium head blight fungicide applications. Wheat quality was #1 grade for CWRS. Rainfall was below normal for the entire growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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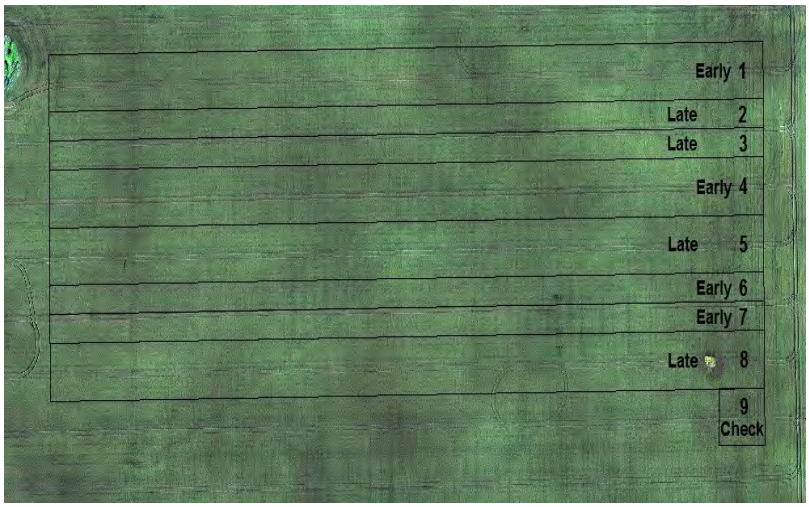
Wheat Fusarium Head Blight Fungicide Timing

Trial ID: 2020-WFHB03 — R.M. of Grey

Objective: The purpose of this project is to quantify the impact of fusarium head blight on the quality of harvested grain by comparing the farmer's normal fungicide application at recommended rate and timing to a fungicide application 3 to 5 days later

TRIAL INFORMATION	
Location	Elm Creek
Previous Crop	Canola
Soil Texture	Clay
Tillage	Zero Tillage
Planting Date	May 09, 2020
Variety	AAC Brandon
Row Spacing	7.5"
Seeding Rate	120 lbs/ac
Fungicide Product	Prosaro XTR
Rec'd App Date	July 06, 2020
Rec'd App Timing	Early Flower
3-5 Days Later	July 10, 2020
Harvest Date	August 26, 2020

FIELD IMAGE



PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	29	36	66	39	**170**
Normal	55	77	60	78	**270**

†Growing season precipitation (mm)

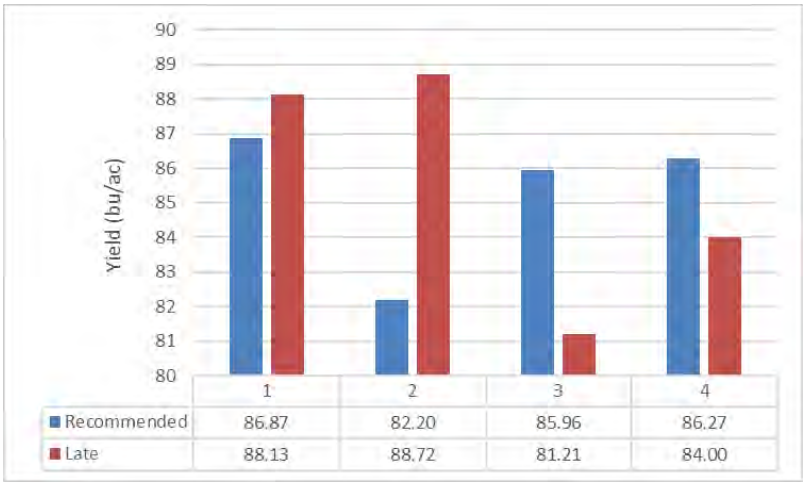
WHEAT QUALITY

	Protein	DON	TWT (kg/hL)	Falling Number
Rec'd Timing	14.5	0.0	81	349
Late Timing	14.6	0.0	81	347

OVERALL YIELD

	Mean (bu/ac)
Rec'd Timing	85.4[A]
Late Timing	85.5[A]
Difference	0.1
P-Value	0.942
CV	3.18%
Significance	No

STRIP YIELD



Summary: **There was no significant yield difference between the recommended timing and late timing for fusarium head blight fungicide timing applications. Wheat quality was consistent for all the treatments, receiving a #1 grade for CWRS. Rainfall was below normal for the entire growing season.**

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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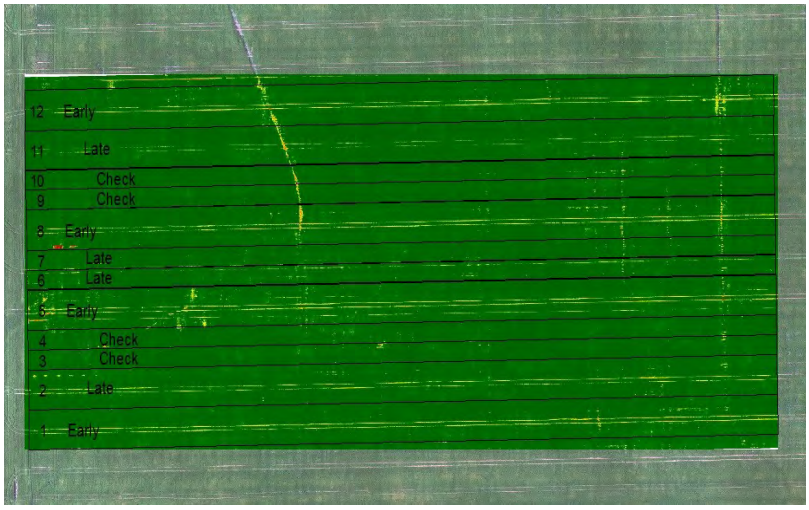
Wheat Fusarium Head Blight Fungicide Timing

Trial ID: 2020-WFHB04 — R.M. of Grey

Objective: The purpose of this project is to quantify the impact of fusarium head blight on the quality of harvested grain by comparing the farmer's normal fungicide application at recommended rate and timing to a fungicide application 3 to 5 days later

TRIAL INFORMATION	
Location	Culross
Previous Crop	Canola
Soil Texture	Clay
Tillage	Zero Tillage
Planting Date	May 13, 2020
Variety	AC Cardale
Row Spacing	10"
Seeding Rate	219 lbs/ac
Fungicide Product	Prosaro XTR
Rec'd App Date	July 06, 2020
Rec'd App Timing	Early Flower
3-5 Days Later	July 10, 2020
Harvest Date	August 22, 2020

FIELD IMAGE



PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	29	36	66	39	**170**
Normal	55	77	60	78	**270**

†Growing season precipitation (mm)

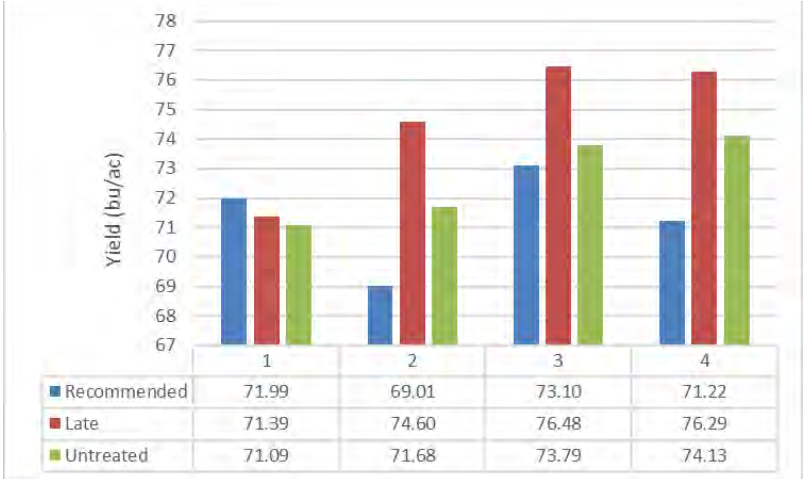
WHEAT QUALITY

	Protein	DON	TWT (kg/hL)	Falling Number
Rec'd Timing	14.0	0.1	77	354
Late Timing	13.8	0.1	77	342
Untreated	14.1	0.1	77	349

OVERALL YIELD

	Mean (bu/ac)
Rec'd Timing	71.3^{B}
Late Timing	74.7^{A}
Untreated	72.7^{AB}
P-Value	0.0443
CV	3.08%
Significance	**Yes**

STRIP YIELD



Summary: There was a significant yield difference between the late timing versus the untreated check for fusarium head blight fungicide applications. Wheat quality was rated as tough #1 grade for CWRS. Rainfall was below normal for the entire growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Fusarium Head Blight Fungicide Timing

Trial ID: 2020-WFHB05 — R.M. of Morris

Objective: The purpose of this project is to quantify the impact of fusarium head blight on the quality of harvested grain by comparing the farmer's normal fungicide application at recommended rate and timing to a fungicide application 3 to 5 days later

TRIAL INFORMATION	
Location	Sperling
Previous Crop	Canola
Soil Texture	Clay
Tillage	Conventional
Planting Date	May 11, 2020
Variety	AAC Brandon
Row Spacing	7.5"
Seeding Rate	140 lbs/ac
Fungicide Product	MIRAVIS Ace
Rec'd App Date	July 06, 2020
Rec'd App Timing	Early Flower
3-5 Days Later	July 10, 2020
Harvest Date	August 24, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	71	83	102	43	**298**
Normal	55	83	66	74	**279**

†Growing season precipitation (mm)

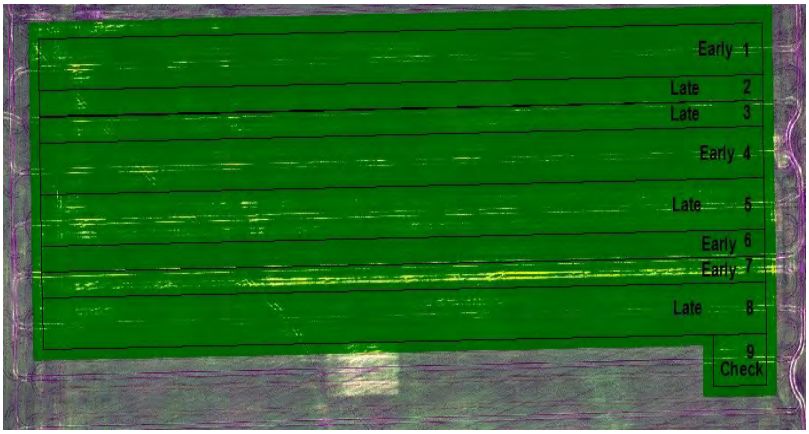
WHEAT QUALITY

	Protein	DON	TWT (kg/hL)	Falling Number
Rec'd Timing	13.5	0.0	82	356
Late Timing	13.7	0.0	81	350

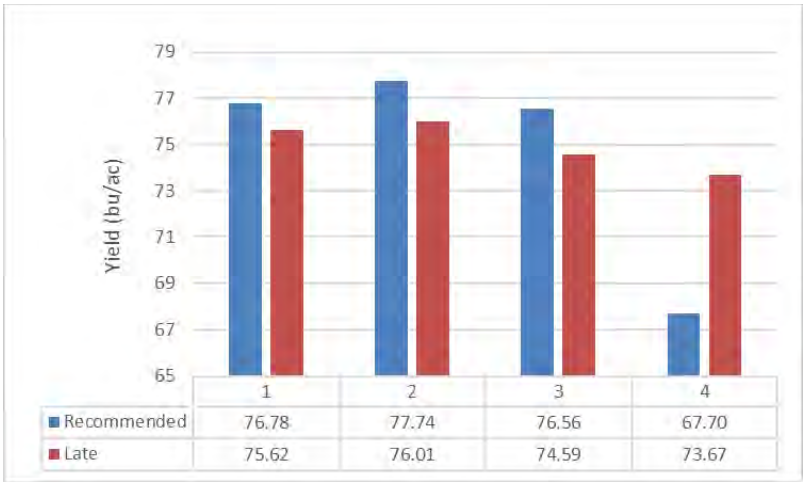
OVERALL YIELD

	Mean (bu/ac)
Rec'd Timing	74.7[A]
Late Timing	75.0[A]
Difference	0.3
P-Value	0.892
CV	4.21%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant yield difference between the recommended and late timing fusarium head blight fungicide applications. Wheat quality was generally #1 grade for CWRS, with two recommended samples downgraded to #2 for low HVK% (hard vitreous kernels). Rainfall was slightly above normal for the entire growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Fusarium Head Blight Fungicide Timing

Trial ID: 2020-WFHB06 — R.M. of Brokenhead

Objective: The purpose of this project is to quantify the impact of fusarium head blight on the quality of harvested grain by comparing the farmer's normal fungicide application at recommended rate and timing to a fungicide application 3 to 5 days later

TRIAL INFORMATION	
Location	Beausejour
Previous Crop	Canola
Soil Texture	Clay
Tillage	Conventional
Planting Date	May 10, 2020
Variety	AAC Brandon
Row Spacing	10"
Seeding Rate	120 lbs/ac
Fungicide Product	Prosaro XTR
Rec'd App Date	July 06, 2020
Rec'd App Timing	Early Flower
3-5 Days Later	July 10, 2020
Harvest Date	August 25, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	11	75	44	117	**247**
Normal	57	85	68	81	**290**

†Growing season precipitation (mm)

WHEAT QUALITY

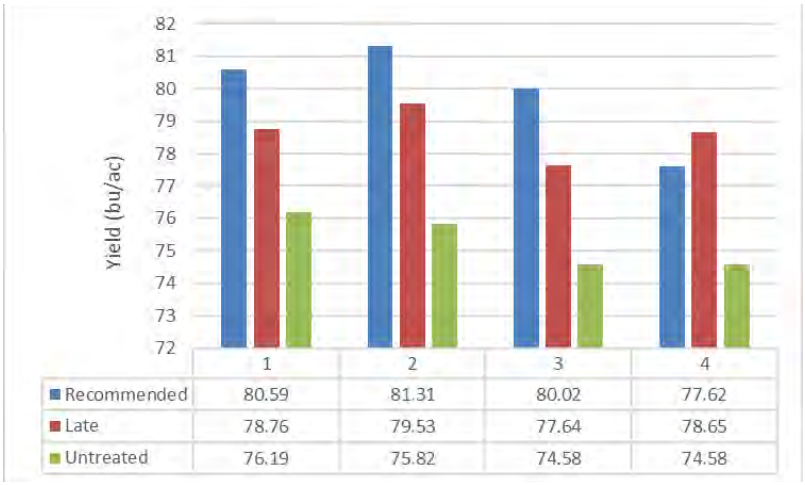
	Protein	DON	TWT (kg/hL)	Falling Number
Rec'd Timing	13.4	0.0	80	342
Late Timing	13.5	0.0	80	349
Untreated	13.5	0.0	79	354

OVERALL YIELD

	Mean (bu/ac)
Rec'd Timing	79.9[A]
Late Timing	78.6[A]
Untreated	75.3[B]
P-Value	0.000593
CV	2.91%
Significance	Yes

FIELD IMAGE

STRIP YIELD



Summary: There was a significant yield difference between the recommended and late timing versus the untreated check for fusarium head blight fungicide applications. Wheat quality was #1 grade for CWRS, except for three samples that were downgraded to #2 for low HVK % (hard vitreous kernels). Rainfall was below normal for the entire growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Fusarium Head Blight Fungicide Timing

Trial ID: 2020-WFHB07 — R.M. of Cartwright-Roblin

Objective: The purpose of this project is to quantify the impact of fusarium head blight on the quality of harvested grain by comparing the farmer's normal fungicide application at recommended rate and timing to a fungicide application 3 to 5 days later

TRIAL INFORMATION	
Location	Cartwright
Previous Crop	Canola
Soil Texture	Clay Loams
Tillage	Zero Tillage
Planting Date	May 27, 2020
Variety	AAC Brandon
Row Spacing	12"
Seeding Rate	119 lbs/ac
Fungicide Product	Caramba
Rec'd App Date	July 10, 2020
Rec'd App Timing	Early Flower
3-5 Days Later	July 15, 2020
Harvest Date	September 10, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	60	19	131	50	**260**
Normal	80	92	54	76	**302**

†Growing season precipitation (mm)

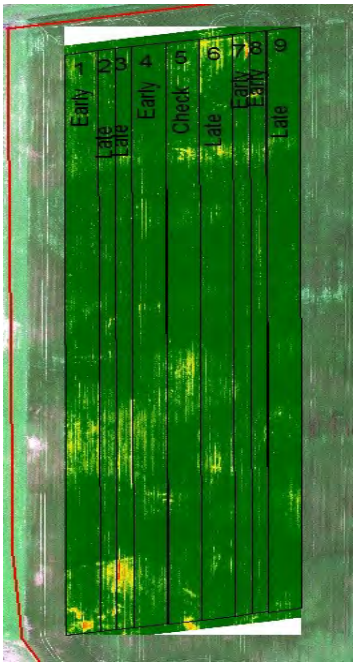
WHEAT QUALITY

	Protein	DON	TWT (kg/hL)	Falling Number
Rec'd Timing	15.5	0.5	81	289
Late Timing	15.1	0.5	80	298
Untreated	15.1	0.5	80	325

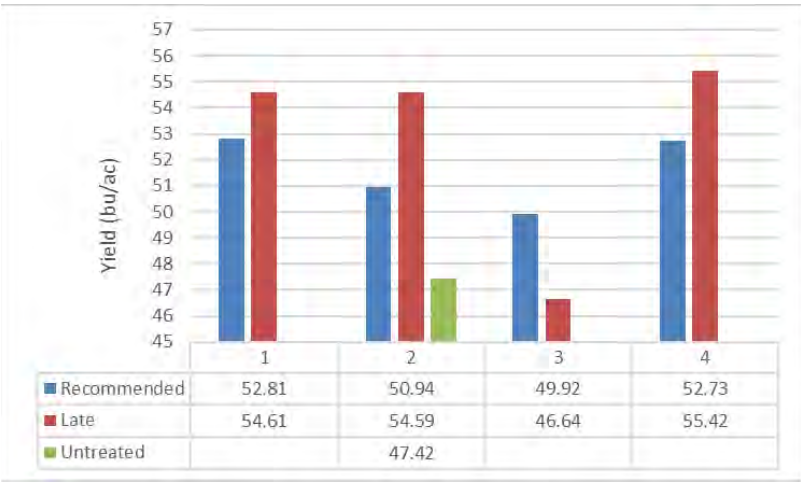
OVERALL YIELD

	Mean (bu/ac)
Rec'd Timing	51.6[A]
Late Timing	52.8[A]
Untreated (Reference)	47.4
P-Value	0.489
CV	5.62%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant yield difference between the recommended timing and late timing for fusarium head blight fungicide timing applications. Wheat quality was consistent for all the treatments, receiving a #1 grade for CWRS, with low levels of DON. Rainfall was below normal for the entire growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Seeding Rate Trial

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate by 20 lbs/ac in wheat.

Summary: There was no significant difference in yield or plant stands between the three seeding rates.

Trial ID	Rural Municipality	Seeding Date	Row Spacing	Seed Rate (check)	Plant Stand @ Mid-season			Yield			CV	P-Value	Statistically Significant @ 95%
					High Seed Rate	Check Seed Rate	Low Seed Rate	High Seed Rate	Check Seed Rate	Low Seed Rate			
			inch	lbs/ac	/ft²			bu/ac			%		
2020-WP01	Roland	May 19	7.5	138	26	23	22	75.4	76.0	75.0	1.9	0.4420	No

Indicates Statistical Difference at 95% confidence interval

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Wheat Seeding Rate

Trial ID: 2020-WP01 — R.M. of Roland

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate by 20 lbs/ac in wheat.

TRIAL INFORMATION

Location	Roland
Previous Crop	Dry Beans
Soil Texture	Clay Loam
Tillage	Conventional
Planting Date	May 19, 2020
Variety	Faller
Row Spacing	7.5”
Seeding Rate (lbs/ac)	118 vs 138 vs 158
Fertilizer (N-P-K-S)	124N 50P 20K 10S
Harvest Date	August 24, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	30	47	81	27	**184**
Normal	55	78	59	79	**271**

†Growing season precipitation (mm)

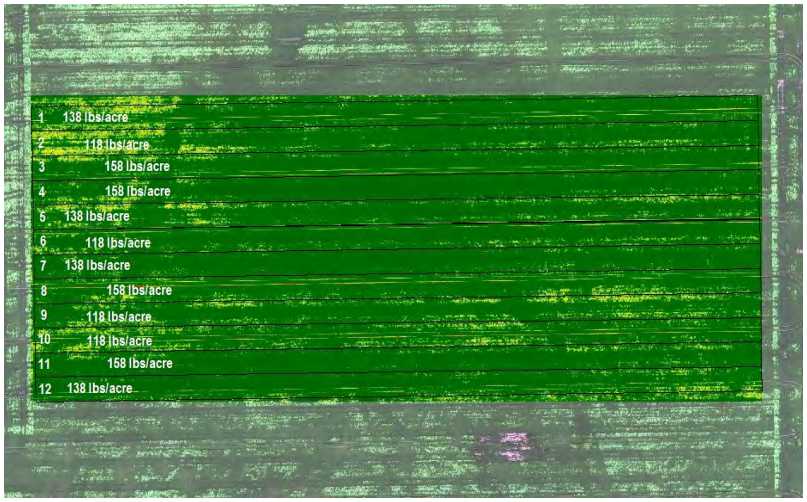
WHEAT RESPONSE

	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
118 lbs/ac	22[A]	14.8	76	331
138 lbs/ac	23[A]	14.8	76	331
158 lbs/ac	26[A]	14.8	76	331

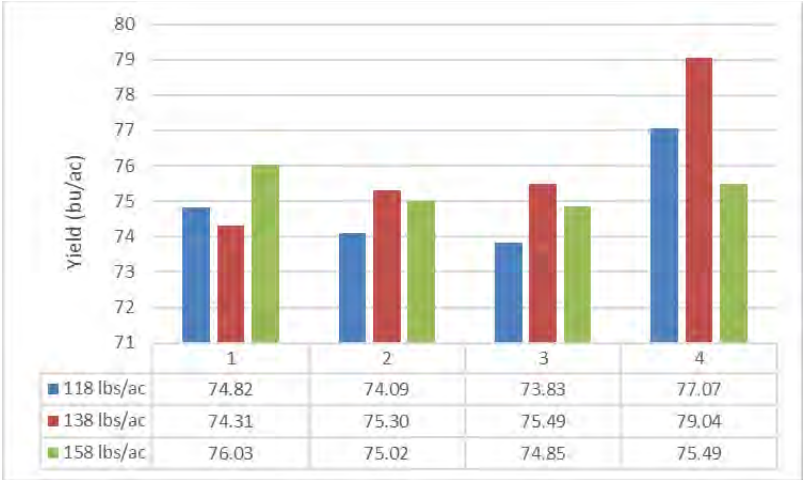
OVERALL YIELD

	Mean (bu/ac)
118 lbs/ac	75.0[A]
138 lbs/ac	76.0[A]
158 lbs/ac	75.4[A]
P-Value	0.442
CV	1.90%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant difference in yield or plant stands between the three seeding rates (118 lbs/ac, 138 lbs/ac and 158 lbs/ac). Rainfall was well below average for the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Plant Growth Regulator Trial

Objective: The purpose of this project is to quantify the agronomic and economic impacts of using a plant growth regulator on plant height, lodging, yield and quality of wheat and barley.

Summary: 2 site-years showed a significant difference in yield and a significant reduction in plant stand using a plant growth regulator versus untreated. Between 2018 and 2020 6 site-years out of 33 have shown a significant difference.

Trial ID	Rural Municipality	Variety	Height			Yield			CV	P-Value	Statistically Significant @ 95%	Protein		
			Manipulator™ 620	Omex	Untreated	Manipulator™ 620	Omex	Untreated				Manipulator™ 620	Omex	Untreated
			cm			bu/ac			%			%		
2020-WPGR05	Woodlands	Marquette	82	85	86	61.8	66.5	63.3	4.4	0.0361	Yes	12.6	12.0	12.8

Trial ID	Rural Municipality	Variety	Height		Height Difference	Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%	Protein	
			Treated	Untreated		Treated	Untreated					Treated	Untreated
			cm		cm	bu/ac		bu/ac	%			%	
2020-WPGR01	De Salaberry	Faller	80	81	-1	79.2	74.3	4.9	7.0	0.0790	No	13.0	12.5
2020-WPGR02	Woodlands	AAC Starbuck	73	72	1	71.5	71.3	0.2	1.4	0.8800	No	15.1	14.9
2020-WPGR03	Tache	AAC Brandon	71	76	-5	74.1	75.6	-1.5	12.0	0.6970	No	14.1	13.8
2020-WPGR04	Alexander	Faller	88	89	-1	92.0	96.1	-4.1	5.7	0.4450	No	13.9	
2020-WPGR06	Morris	AAC Brandon	77	82	-5	77.0	76.9	0.1	1.1	0.0915	No	15.3	14.6
2020-WPGR07	Montcalm	AAC Brandon	68	76	-8	75.5	72.6	2.9	2.5	0.0006	Yes	14.4	14.9
2020-WPGR08	Louise	AAC Redberry	82	85	-3	57.4	56.6	0.8	3.4	0.0620	No	16.3	15.6
2020-WPGR09	Morris	Faller	76	83	-7	102.1	98.8	3.3	2.9	0.0621	No	12.2	12.6
2020-BPGR01	Westlake-Gladstone	CDC Austenson	59	62	-3	102.4	107.7	-5.3	3.6	0.0611	No	12.9	12.9

Indicates Statistical Difference at 95% confidence interval

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Wheat Plant Growth Regulator Trial cont'd

Trial ID	Rural Municipality	Variety	Height		Height Difference	Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%	Protein	
			Treated	Untreated		Treated	Untreated					Treated	Untreated
			cm		cm	bu/ac		bu/ac	%			%	
2018-WPGR01	Morris	AAC Brandon	57	66	-9	64.6	65.0	-0.4	1.8	0.6629	No	16.4	16.4
2018-WPGR02	Rhineland	AAC Brandon	77	86	-10	100.8	97.5	3.4	2.5	0.0455	Yes	14.1	14.5
2018-WPGR03	Grey	AAC Brandon	63	73	-10	75.6	74.9	0.7	1.8	0.3317	No	13.1	13.1
2018-WPGR04	Pembina	Faller	81	90	-10	103.7	99.9	3.7	6.8	0.4920	No	13.1	13.4
2018-WPGR05	Hanover	SY Rowyn	83	87	-4	96.9	94.9	2.0	1.7	0.0855	No	11.3	11.8
2018-WPGR06	Oakland-Wawaneesa	AC Cardale	78	90	-11	78.4	78.4	0.0	4.7	0.9905	No	13.6	13.7
2018-WPGR07	Woodlands	AAC Brandon	79	87	-8	69.9	69.3	0.6	2.4	0.6340	No	13.3	14.8
2018-WPGR08	Killarney-Turtle Mountain	AAC Brandon	86	90	-4	95.9	94.3	1.6	1.4	0.1823	No	14.2	14.1
2018-WPGR09	St. Andrews	AAC Brandon	84	91	-7	86.5	79.5	7.0	5.8	0.0323	Yes	12.7	12.3
2018-WPGR10	Macdonald		63	71	-8	94.2	85.9	8.3	10.2	0.2249	No	15.4	15.5
2019-WPGR01	St. Clements	AAC Brandon	31	34	-3	95.6	92.9	2.7	5.8	0.5127	No	13.5	13.8
2019-WPGR02	Roland	AAC Brandon	27	36	-9	72.7	70.0	2.7	2.5	0.0253	Yes	15.2	15.5
2019-WPGR03	Roland	AAC Brandon	27	29	-2	52.3	48.4	3.9	7.3	0.2768	No	11.0	11.0
2019-WPGR04	Hanover	AAC Brandon	27	30	-3	66.5	65.3	1.2	3.1	0.2420	No	14.6	14.7
2019-WPGR05	St. Pierre	AAC Brandon	29	32	-3	59.6	59.3	0.3	3.9	0.8271	No	14.8	14.8
2019-WPGR06	Morris	AAC Cameron VB	31	31	0	47.6	46.2	1.4	2.8	0.3342	No	15.0	14.9
2019-WPGR07	St. Andrews	AAC Brandon	27	29	-2	57.3	59.2	-1.9	3.7	0.0548	No	13.7	13.4
2019-WPGR08	Oakland-Wawanesa	AC Cardale	33	36	-3	58.1	54.6	3.5	4.0	0.0012	Yes	15.5	15.7
2019-WPGR09	Woodlands	Faller	31	33	-2	81.1	78.0	3.1	5.4	0.2331	No	12.4	11.8
2019-WPGR10	Woodlands	AAC Brandon	29	32	-3	77.9	73.3	4.6	4.1	0.0490	Yes	14.4	14.5
2019-WPGR11	Macdonald	AAC Brandon	27	28	-1	53.4	53.0	0.4	3.5	0.8025	No	15.1	15.1
2019-WPGR12	Tache	SY Rowyn	24	26	-2	55.6	54.6	1.0	1.9	0.3332	No	13.3	13.4
2019-WPGR13	Lorne	AC Cardale	32	34	-2	72.5	69.8	2.7	7.3	0.2768	No	16.7	16.8

Indicates Statistical Difference at 95% confidence interval

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Wheat Plant Growth Regulator

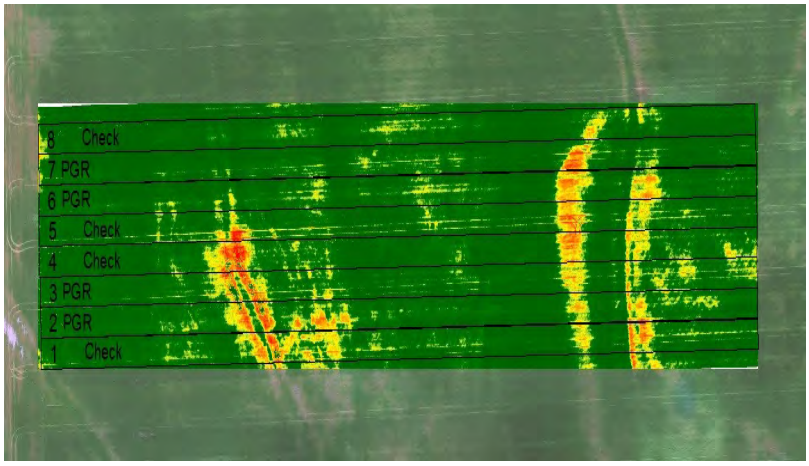
Trial ID: 2020-WPGR01 — R.M. of De Salaberry

Objective: The purpose of this project is to quantify the impact of the plant growth regulator Manipulator™ 620 (chlormequat chloride) on plant height, lodging, yield and quality of spring wheat

TRIAL INFORMATION

Treatment	Manipulator™ 620 vs. Untreated
Location	St. Pierre
Previous Crop	Canola
Soil Texture	Clay
Tillage	Conventional
Planting Date	May 12, 2020
Variety	Faller
Row Spacing	10”
Seeding Rate	130 lbs/ac
Residual N	——
Fertilizer (N-P-K-S)	
Application Date	June 06, 2020
Application Timing	5L
Application Rate	0.7 L/ac
Harvest Date	August 20, 2020

FIELD IMAGE



PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	15	105	102	68	**290**
Normal	56	90	61	61	**269**

†Growing season precipitation (mm)

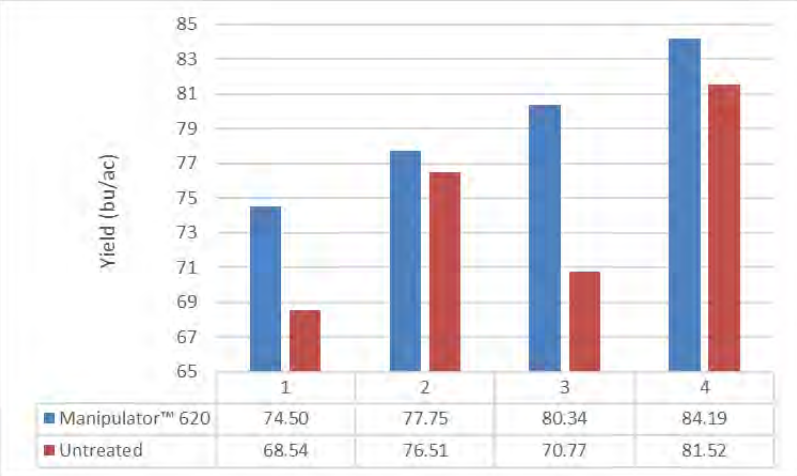
WHEAT RESPONSE

	Plant Height (cm)	Lodging		Protein %
		Incidence (%)	Severity (1-10)	
Manipulator™ 620	80	10	2	13.0
Untreated	81	10	2	12.5

OVERALL YIELD

	Mean (bu/ac)
Manipulator™ 620	79.2
Untreated	74.3
Yield Difference	4.9
P-Value	0.079
CV	7.0%
Significance	No

STRIP YIELD



Summary: There was no significant yield difference between the Manipulator™ 620 plant growth regulator application and the untreated check. There was no significant reduction in plant height due to the plant growth regulator application. There was minimal lodging observed within the trial. Rainfall was below normal in May and above normal in June, July and August.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Plant Growth Regulator

Trial ID: 2020-WPGR02 — R.M. of Woodlands

Objective: The purpose of this project is to quantify the impact of the plant growth regulator Manipulator™ 620 (chlormequat chloride) on plant height, lodging, yield and quality of spring wheat

TRIAL INFORMATION	
Treatment	Manipulator™ 620 vs. Untreated
Location	Warren
Previous Crop	Canola
Soil Texture	Clay
Tillage	Conventional
Planting Date	May 12, 2020
Variety	AAC Starbuck VB
Row Spacing	10”
Seeding Rate	100 lbs/ac
Residual N	——
Fertilizer (N-P-K-S)	120N 50P 10S
Application Date	June 11, 2020
Application Timing	4-5L
Application Rate	0.7 L/ac
Harvest Date	August 21, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	36	43	54	92	**225**
Normal	58	83	60	72	**274**

†Growing season precipitation (mm)

WHEAT RESPONSE

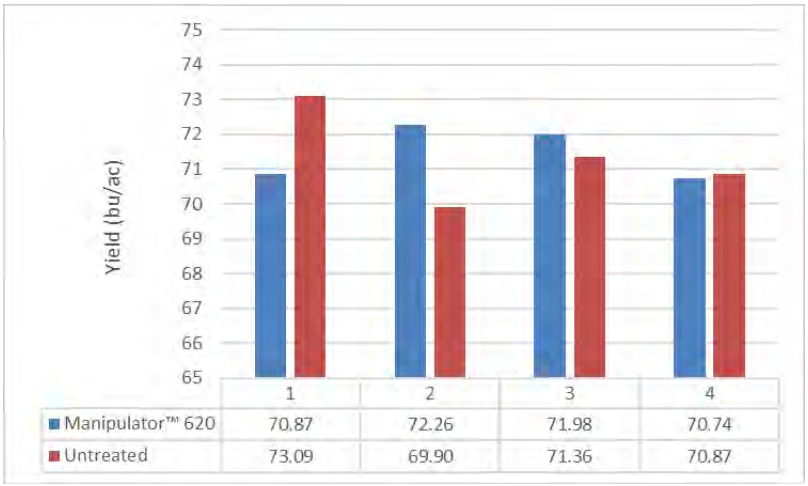
	Plant Height (cm)	Lodging		Protein %
		Incidence (%)	Severity (1-10)	
Manipulator™ 620	73	0	1	15.1
Untreated	72	0	1	14.9

OVERALL YIELD

	Mean (bu/ac)
Manipulator™ 620	71.5
Untreated	71.3
Yield Difference	0.2
P-Value	0.88
CV	1.4%
Significance	No

FIELD IMAGE

STRIP YIELD



Summary: There was no significant yield difference between the Manipulator™ 620 plant growth regulator application and the untreated check. There was no significant reduction in plant height due to the plant growth regulator application. There was no lodging observed within the trial. Rainfall was below normal for the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Plant Growth Regulator

Trial ID: 2020-WPGR03 — R.M. of Tache

Objective: The purpose of this project is to quantify the impact of the plant growth regulator Manipulator™ 620 (chlormequat chloride) on plant height, lodging, yield and quality of spring wheat

TRIAL INFORMATION	
Treatment	Manipulator™ 620 vs. Untreated
Location	Landmark
Previous Crop	Soybeans
Soil Texture	Clay
Tillage	Conventional
Planting Date	April 30, 2020
Variety	AAC Brandon
Row Spacing	10”
Seeding Rate	153 lbs/ac
Residual N	——
Fertilizer (N-P-K-S)	128N 33P 15S
Application Date	June 11, 2020
Application Timing	4L
Application Rate	0.7 L/ac
Harvest Date	August 18, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	15	59	93	82	**248**
Normal	61	87	74	73	**296**

†Growing season precipitation (mm)

WHEAT RESPONSE

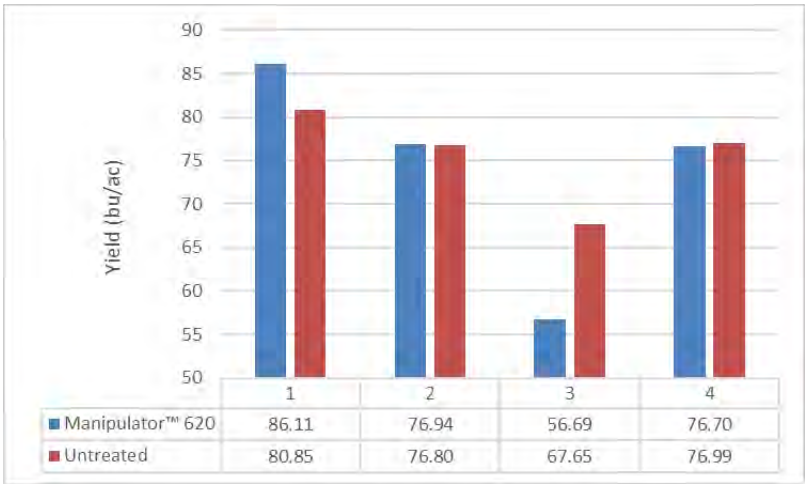
	Plant Height (cm)	Lodging		Protein %
		Incidence (%)	Severity (1-10)	
Manipulator™ 620	71	0	1	14.1
Untreated	76	0	1	13.8

OVERALL YIELD

	Mean (bu/ac)
Manipulator™ 620	74.1
Untreated	75.6
Yield Difference	-1.5
P-Value	0.697
CV	12%
Significance	No

FIELD IMAGE

STRIP YIELD



Summary: There was no significant yield difference between the Manipulator™ 620 plant growth regulator application and the untreated check. There was a significant reduction in plant height due to the plant growth regulator application. There was no lodging observed within the trial. Rainfall was below normal for the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Plant Growth Regulator

Trial ID: 2020-WPGR04 — R.M. of Alexander

Objective: The purpose of this project is to quantify the impact of the plant growth regulator Manipulator™ 620 (chlormequat chloride) on plant height, lodging, yield and quality of spring wheat

TRIAL INFORMATION

Treatment	Manipulator™ 620 vs. Untreated
Location	Stead
Previous Crop	Soybeans
Soil Texture	Clay
Tillage	Conventional
Planting Date	May 16, 2020
Variety	Faller
Row Spacing	10”
Seeding Rate	150 lbs/ac
Residual N	——
Fertilizer (N-P-K-S)	130N 40P 40K
Application Date	June 11, 2020
Application Timing	5L
Application Rate	0.7 L/ac
Harvest Date	August 25, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	11	75	44	116	**246**
Normal	57	85	68	80	**290**

†Growing season precipitation (mm)

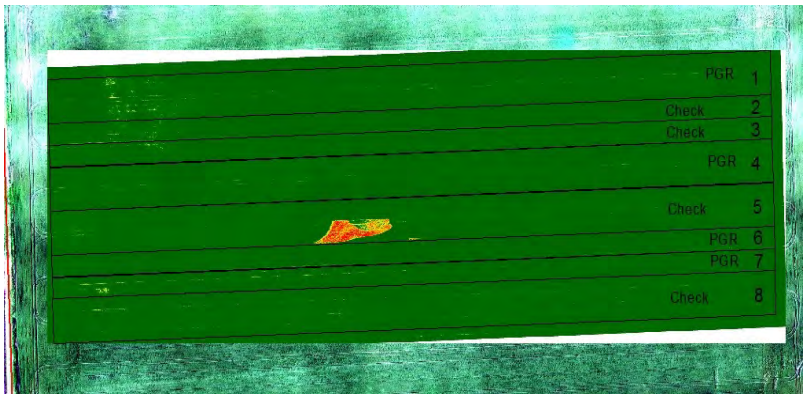
WHEAT RESPONSE

	Plant Height (cm)	Lodging		Protein %
		Incidence (%)	Severity (1-10)	
Manipulator™ 620	88	0	1	13.9
Untreated	89	0	1	

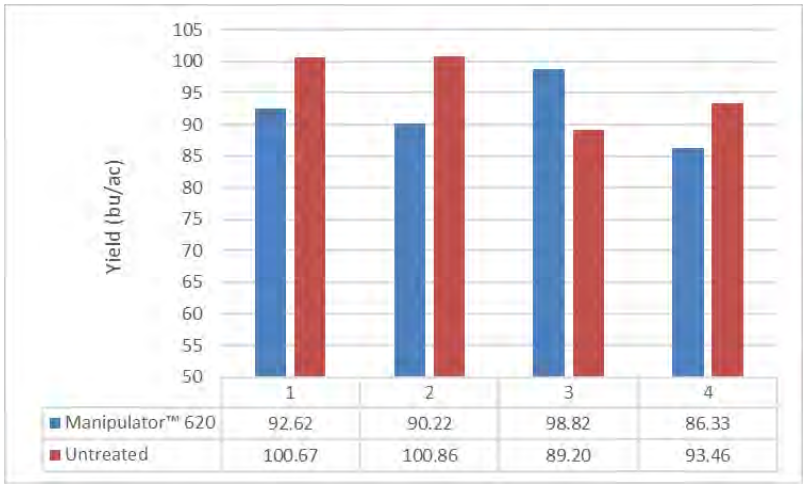
OVERALL YIELD

	Mean (bu/ac)
Manipulator™ 620	92.0
Untreated	96.1
Yield Difference	-4.1
P-Value	0.445
CV	5.7%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant yield difference between the Manipulator™ 620 plant growth regulator application and the untreated check. There was no significant reduction in plant height due to the plant growth regulator application. There was no lodging observed within the trial. Rainfall was below normal for the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Plant Growth Regulator

Trial ID: 2020-WPGR05 — R.M. of Woodlands

Objective: The purpose of this project is to quantify the impact of the plant growth regulator Manipulator™ 620 (chlormequat chloride) and Omex on plant height, lodging, yield and quality of spring wheat

TRIAL INFORMATION

Treatment	Manipulator™ 620 vs. Omex EZ-GRO K vs. Untreated
Location	Marquette
Previous Crop	Canola
Soil Texture	Clay Loam
Tillage	Minimal Tillage
Planting Date	May 21, 2020
Variety	Faller
Row Spacing	10”
Seeding Rate	130 lbs/ac
Residual N	——
Fertilizer (N-P-K-S)	140N
Application Date	June 13 & 18, 2020
Application Timing	3L (Omex), 5L Manipulator
Application Rate	0.7 L/ac , 40 ac/jug (Omex)
Harvest Date	September 05, 2020

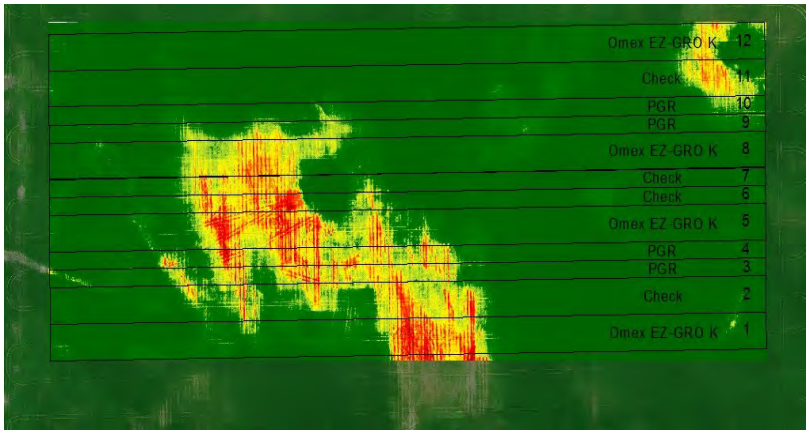
WHEAT RESPONSE

	Plant Height (cm)	Lodging Incidence (%)	Lodging Severity (1-10)	Protein %
Manipulator™ 620	82	0	1	12.6
Omex	85	0	1	12.0
Untreated	86	0	1	12.8

OVERALL YIELD

	Mean (bu/ac)
Manipulator™ 620	61.8^{B}
Omex	66.5^{A}
Untreated	63.3^{B}
P-Value	0.0361
CV	4.38%
Significance	Yes

FIELD IMAGE

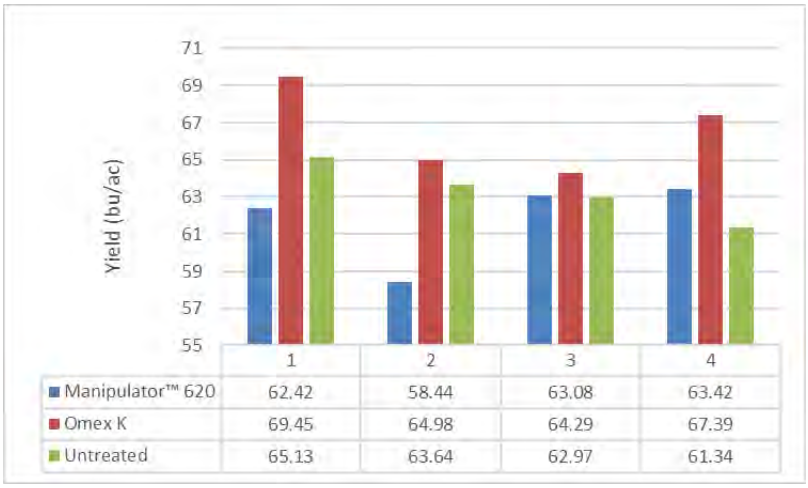


PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	75	43	54	92	**264**
Normal	58	83	60	72	**274**

†Growing season precipitation (mm)

STRIP YIELD



Summary: There was a significant yield difference between the Omex plant growth regulator application and the Manipulator™ 620 and untreated check. There was no significant reduction in plant height due to the plant growth regulator applications. There was no lodging observed within the trial. Rainfall was above normal in May and August and below normal in June and July.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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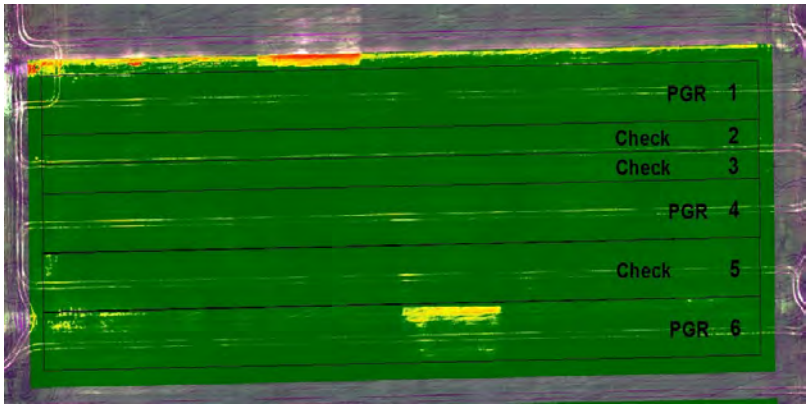
Wheat Plant Growth Regulator

Trial ID: 2020-WPGR06 — R.M. of Morris

Objective: The purpose of this project is to quantify the impact of the plant growth regulator Manipulator™ 620 (chlormequat chloride) on plant height, lodging, yield and quality of spring wheat

TRIAL INFORMATION	
Treatment	Manipulator™ 620 vs. Untreated
Location	Sperling
Previous Crop	Canola
Soil Texture	Clay
Tillage	Conventional Tillage
Planting Date	May 11, 2020
Variety	AAC Brandon
Row Spacing	7.5”
Seeding Rate	140 lbs/ac
Residual N	——
Fertilizer (N-P-K-S)	142N 60P
Application Date	June 12, 2020
Application Timing	6L
Application Rate	0.7 L/ac
Harvest Date	August 24, 2020

FIELD IMAGE



PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	71	83	102	43	**298**
Normal	55	83	66	74	**279**

†Growing season precipitation (mm)

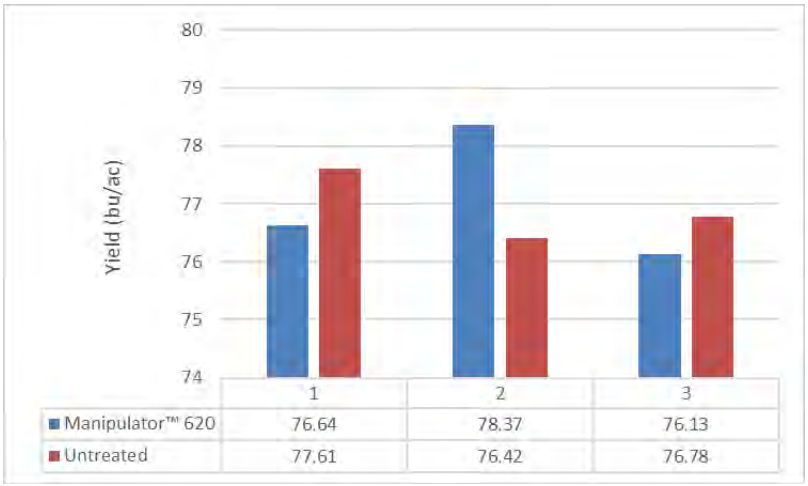
WHEAT RESPONSE

	Plant Height (cm)	Lodging		Protein %
		Incidence (%)	Severity (1-10)	
Manipulator™ 620	77	0	1	15.3
Untreated	82	0	1	14.6

OVERALL YIELD

	Mean (bu/ac)
Manipulator™ 620	77.0
Untreated	76.9
Yield Difference	0.1
P-Value	0.0915
CV	1.09%
Significance	No

STRIP YIELD



Summary: There was no significant yield difference between the Manipulator™ 620 plant growth regulator application and the untreated check. There was a significant reduction in plant height due to the plant growth regulator application. There was no lodging observed within the trial. Rainfall was above normal for the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Plant Growth Regulator

Trial ID: 2020-WPGR07 — R.M. of Montcalm

Objective: The purpose of this project is to quantify the impact of the plant growth regulator Manipulator™ 620 (chlormequat chloride) on plant height, lodging, yield and quality of spring wheat

TRIAL INFORMATION	
Treatment	Manipulator™ 620 vs. Untreated
Location	Morris
Previous Crop	Soybeans
Soil Texture	Clay
Tillage	Conventional Tillage
Planting Date	May 05, 2020
Variety	AAC Brandon
Row Spacing	10”
Seeding Rate	123 lbs/ac
Residual N	——
Fertilizer (N-P-K-S)	139N 42P 10K
Application Date	June 12, 2020
Application Timing	5L
Application Rate	0.7 L/ac
Harvest Date	August 26, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	11	79	99	118	**306**
Normal	56	84	65	74	**278**

†Growing season precipitation (mm)

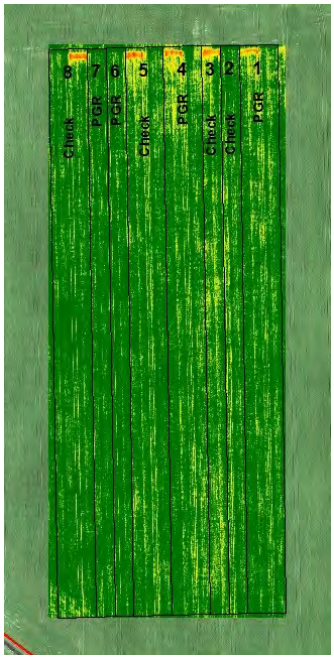
WHEAT RESPONSE

	Plant Height (cm)	Lodging		Protein %
		Incidence (%)	Severity (1-10)	
Manipulator™ 620	68	0	1	14.4
Untreated	76	0	1	14.9

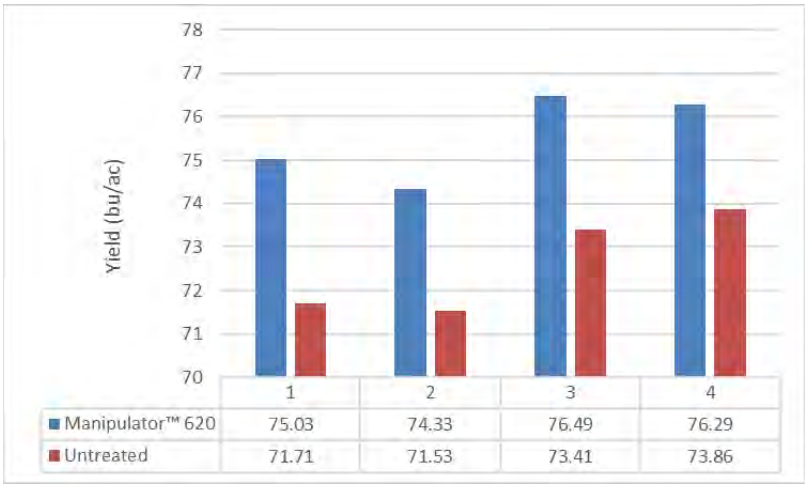
OVERALL YIELD

	Mean (bu/ac)
Manipulator™ 620	75.5
Untreated	72.6
Yield Difference	2.9
P-Value	0.00063
CV	2.5%
Significance	**Yes**

FIELD IMAGE



STRIP YIELD



Summary: There was a significant yield difference between the Manipulator™ 620 plant growth regulator application and the untreated check. There was a significant reduction in plant height due to the plant growth regulator application. There was no lodging observed within the trial. Rainfall was above normal for the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Plant Growth Regulator

Trial ID: 2020-WPGR08 — R.M. of Louise

Objective: The purpose of this project is to quantify the impact of the plant growth regulator Manipulator™ 620 (chlormequat chloride) on plant height, lodging, yield and quality of spring wheat

TRIAL INFORMATION	
Treatment	Manipulator™ 620 vs. Untreated
Location	Crystal City
Previous Crop	Canola
Soil Texture	Clay Loam
Tillage	Minimal Tillage
Planting Date	May 20, 2020
Variety	AAC Redberry
Row Spacing	7.5”
Seeding Rate	131 lbs/ac
Residual N	——
Fertilizer (N-P-K-S)	120N 40P 15K
Application Date	June 16, 2020
Application Timing	5L
Application Rate	0.7 L/ac
Harvest Date	August 26, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	46	36	174	31	**287**
Normal	62	86	66	79	**293**

†Growing season precipitation (mm)

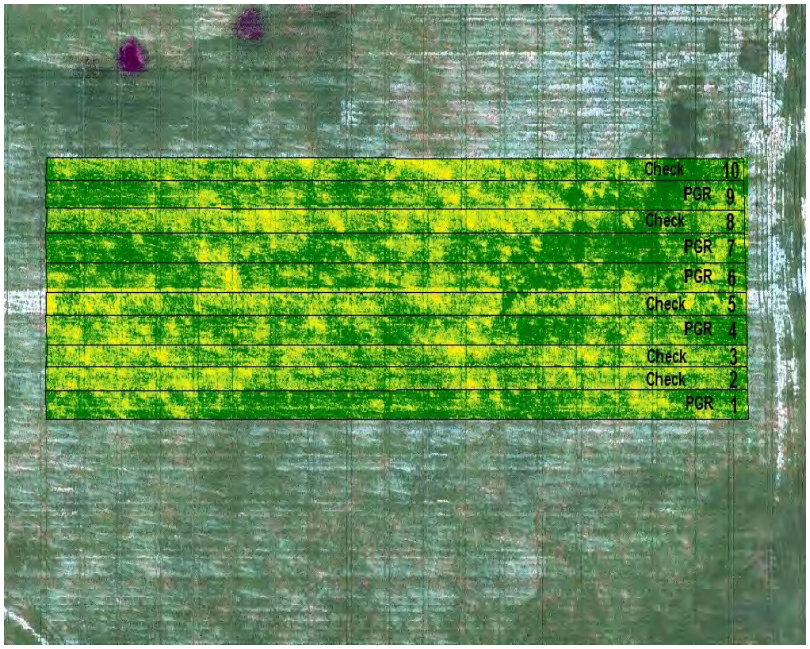
WHEAT RESPONSE

	Plant Height (cm)	Lodging		Protein %
		Incidence (%)	Severity (1-10)	
Manipulator™ 620	82	50	6	16.3
Untreated	85	50	6	15.6

OVERALL YIELD

	Mean (bu/ac)
Manipulator™ 620	57.4
Untreated	56.6
Yield Difference	0.8
P-Value	0.062
CV	3.4%
Significance	No

FIELD IMAGE



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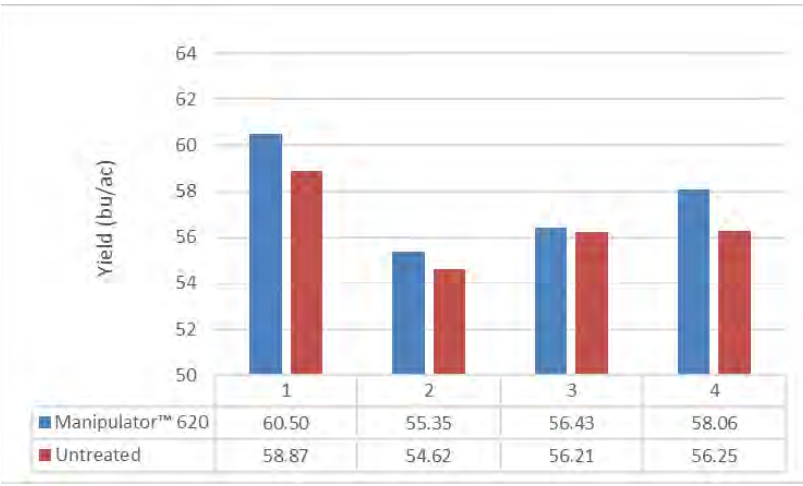

Summary: There was no significant yield difference between the Manipulator™ 620 plant growth regulator application and the untreated check. There was a significant reduction in plant height due to the plant growth regulator application. There was lodging observed within the trial, due to heavy rainfall in July storms.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Plant Growth Regulator

Trial ID: 2020-WPGR09 — R.M. of Morris

Objective: The purpose of this project is to quantify the impact of the plant growth regulator Manipulator™ 620 (chlormequat chloride) on plant height, lodging, yield and quality of spring wheat

TRIAL INFORMATION

Treatment	Manipulator™ 620 vs. Untreated
Location	Rosenort
Previous Crop	Soybeans
Soil Texture	Clay
Tillage	Minimal Tillage
Planting Date	May 23, 2020
Variety	Faller
Row Spacing	7.5”
Seeding Rate	170 lbs/ac
Residual N	——
Fertilizer (N-P-K-S)	150N 210P
Application Date	June 18, 2020
Application Timing	5L
Application Rate	0.7 L/ac
Harvest Date	August 28, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	11	79	99	118	**306**
Normal	56	84	65	74	**278**

†Growing season precipitation (mm)

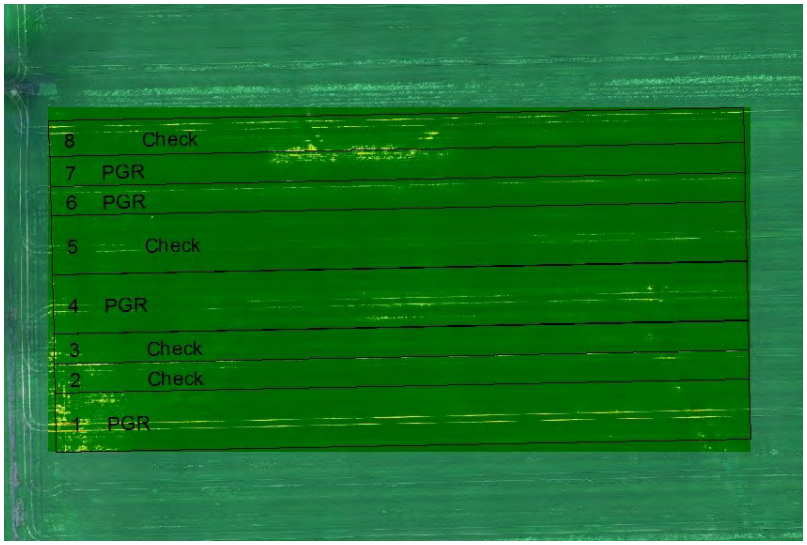
WHEAT RESPONSE

	Plant Height (mm)	Lodging		Protein %
		Incidence (%)	Severity (1-10)	
Manipulator™ 620	76	0	1	12.2
Untreated	83	0	1	12.6

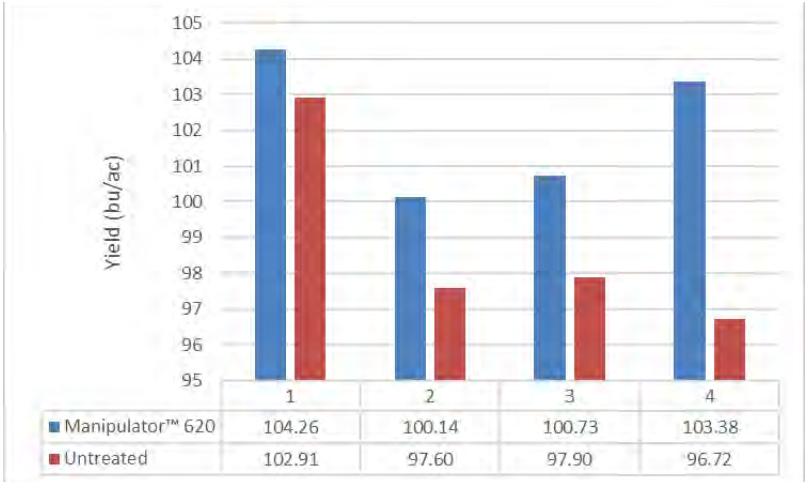
OVERALL YIELD

	Mean (bu/ac)
Manipulator™ 620	102.1
Untreated	98.8
Difference	3.3
P-Value	0.0621
CV	2.9%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant yield difference between the Manipulator™ 620 plant growth regulator application and the untreated check. There was a significant reduction in plant height due to the plant growth regulator application. There was no lodging observed within the trial. Rainfall was above normal for the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Barley Plant Growth Regulator

Trial ID: 2020-BPGR01 — R.M. of Westlake-Gladstone

Objective: The purpose of this project is to quantify the impact of the plant growth regulator Manipulator™ 620 (chlormequat chloride) on plant height, lodging, yield and quality of spring wheat

TRIAL INFORMATION

Treatment	Manipulator™ 620 vs. Untreated
Location	Westbourne
Previous Crop	Canola
Soil Texture	Clay
Tillage	Minimal Tillage
Planting Date	May 08, 2020
Variety	CDC Austenson
Row Spacing	7.5”
Seeding Rate	130 lbs/ac
Residual N	——
Fertilizer (N-P-K-S)	109N 40P
Application Date	June 05, 2020
Application Timing	4-5L
Application Rate	0.7 L/ac
Harvest Date	August 05, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	5	49	73	81	**208**
Normal	52	68	67	76	**263**

†Growing season precipitation (mm)

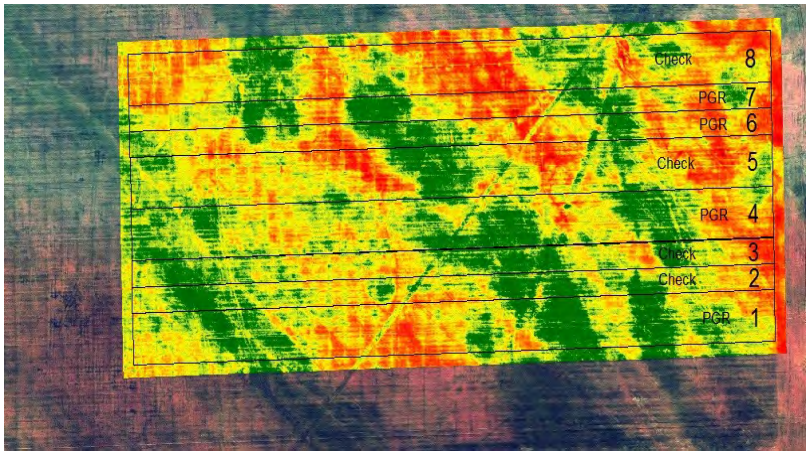
WHEAT RESPONSE

	Plant Height (cm)	Lodging		Protein %
		Incidence (%)	Severity (1-10)	
Manipulator™ 620	59	0	1	12.9
Untreated	62	0	1	12.9

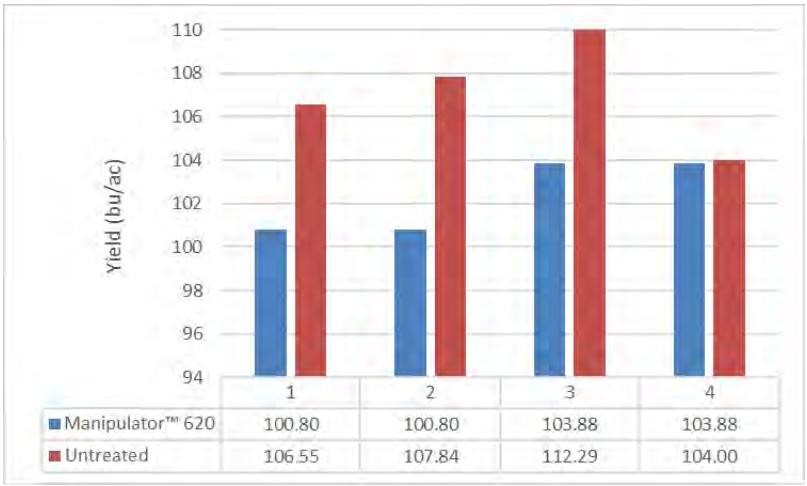
OVERALL YIELD

	Mean (bu/ac)
Manipulator™ 620	102.4
Untreated	107.7
Difference	-5.3
P-Value	0.0611
CV	3.6%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant yield difference between the Manipulator™ 620 plant growth regulator application and the untreated check. There was a significant reduction in plant height due to the plant growth regulator application. There was no lodging observed within the trial. Rainfall was below normal for the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Seed Treatment Trial

Objective: The purpose of this project is to quantify the economic and agronomic impacts of using a seed treatment in wheat.

Summary: One site-year showed a significant difference in yield using a seed treatment. The remaining trials showed no effect from the seed treatment.

Trial ID	Rural Municipality	Seeding Date	Product	Yield		Yield Difference	CV	P-Value	Statistically Significant @ 95%
				Treated	Untreated				
				bu/ac		bu/ac	%		
2020-WST01	Rhineland	May 1	Raxil Pro	62.0	61.1	0.9	2.2	0.5460	No
2020-WST02	De Salaberry	May 04	Insure Cereal FX4	55.7	55.3	0.4	2.4	0.7670	No
2020-WST03	Morris	May 1	Cruiser Vibrance Quattro	79.4	78.8	0.6	2.1	0.5420	No
2020-WST04	De Salaberry	May 11	Raxil Pro	84.5	83.5	1.0	3.3	0.4590	No
2020-WST05	St. Clements	May 12	Cruiser Vibrance Quattro / Awaken® ST	79.9	79.8	0.1	2.2	0.9710	No
2020-WST06	Tache	May 12	Insure Cereal FX4	73.8	70.2	3.6	5.3	0.2200	No
2020-WST07	Dauphin	May 17	Raxil Pro	70.6	70.4	0.2	3.4	0.8067	No
2020-WST08	Gilbert Plains	May 26	Raxil Pro	80.1	76.1	**4.0**	4.8	0.0037	**Yes**
2020-WST09	North Norfolk	May 30	Raxil Pro	47.6	48.5	-0.9	4.2	0.4041	No

Indicates Statistical Difference at 95% confidence interval

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Wheat Seed Treatment

Trial ID: 2020-WST01 — R.M. of Rhineland

Objective: The purpose of this project is to quantify the impacts of seed treatment in wheat.

TRIAL INFORMATION	
Location	Rosenfeld
Previous Crop	Peas
Soil Texture	Clay
Tillage	Conventional
Planting Date	May 01, 2020
Variety	AAC Brandon
Product	Raxil Pro
Row Spacing	9”
Seeding Rate	120 lbs/ac
Fertilizer (N-P-K-S)	137N 55P
Harvest Date	August 12, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	31	48	108	35	**222**
Normal	63	90	63	73	**288**

†Growing season precipitation (mm)

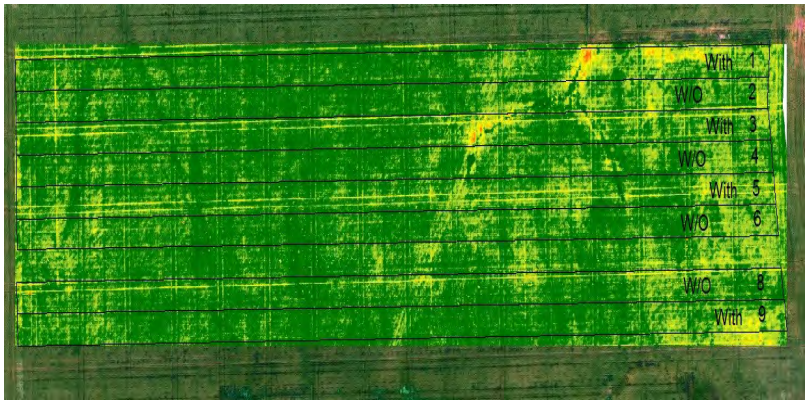
WHEAT RESPONSE

	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
Treated	30[A]	14.8	83	349
Untreated	26[A]	14.8	83	371

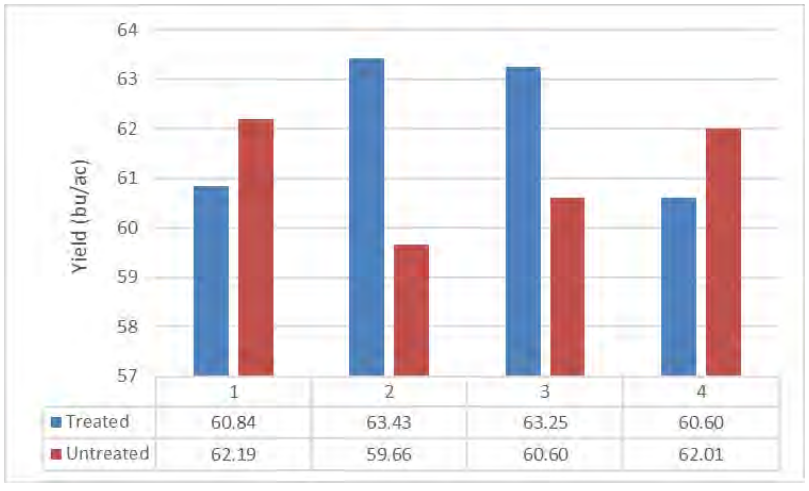
OVERALL YIELD

	Mean (bu/ac)
Treated	62.0[A]
Untreated	61.1[A]
Difference	0.9
P-Value	0.546
CV	2.21%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant yield difference between the seed treatment and the untreated check. There was no significant difference in plant stand due to the use of seed treatment. There was minimal lodging observed within the trial. Rainfall was below normal every month except July.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Seed Treatment

Trial ID: 2020-WST02 — R.M. of De Salaberry

Objective: The purpose of this project is to quantify the impacts of seed treatment in wheat.

TRIAL INFORMATION	
Location	Otterburne
Previous Crop	Soybeans
Soil Texture	Clay
Tillage	Zero Tillage
Planting Date	May 04, 2020
Variety	AAC Brandon
Product	Insure Cereal FX4
Row Spacing	10”
Seeding Rate	144 lbs/ac
Fertilizer (N-P-K-S)	121N 29P
Harvest Date	August 18, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	15	105	102	68	**290**
Normal	56	90	61	61	**269**

†Growing season precipitation (mm)

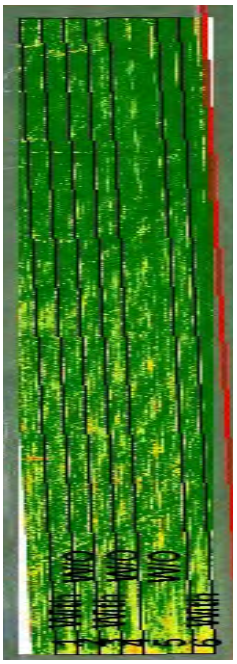
WHEAT RESPONSE

	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
Treated	15[A]	12.2	80	322
Untreated	16[A]	12.6	80	325

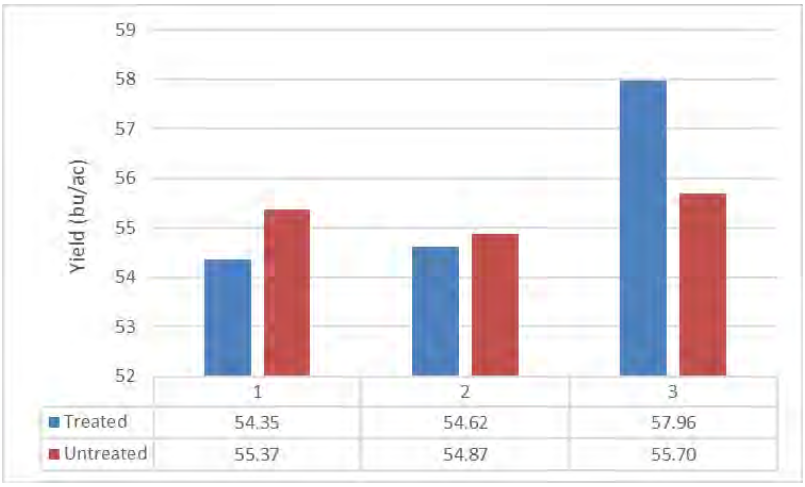
OVERALL YIELD

	Mean (bu/ac)
Treated	55.7[A]
Untreated	55.3[A]
Difference	0.4
P-Value	0.767
CV	2.37%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant yield difference between the seed treatment and the untreated check. There was no significant difference in plant stand due to the use of seed treatment. Plant stand and yields were affected by frost on May 30th and dryness in month of May. Rainfall was below normal in May and above rest of growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Seed Treatment

Trial ID: 2020-WST03 — R.M. of Morris

Objective: The purpose of this project is to quantify the impacts of seed treatment in wheat.

TRIAL INFORMATION	
Location	Sperling
Previous Crop	Canola
Soil Texture	Clay
Tillage	Minimal Tillage
Planting Date	May 01, 2020
Variety	SY Gabbro
Product	Cruiser Vibrance Quatto
Row Spacing	7.5”
Seeding Rate	157 lbs/ac
Fertilizer (N-P-K-S)	136N 75P
Harvest Date	August 18, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	71	83	102	43	**298**
Normal	55	83	66	74	**279**

†Growing season precipitation (mm)

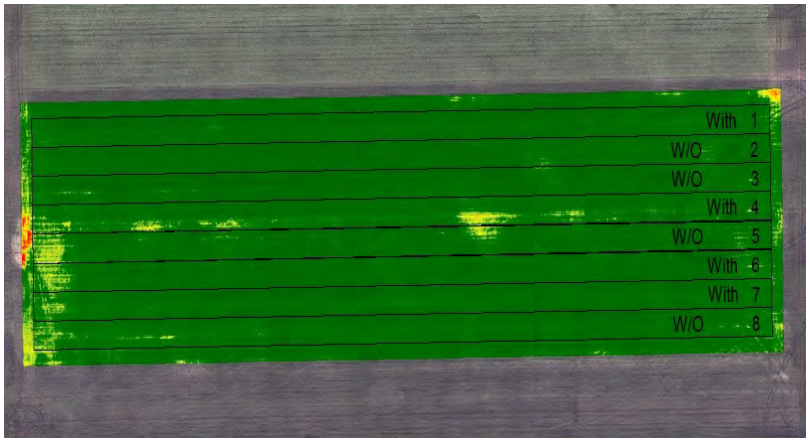
WHEAT RESPONSE

	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
Treated	27[A]	15.4	82	363
Untreated	28[A]	15.8	82	366

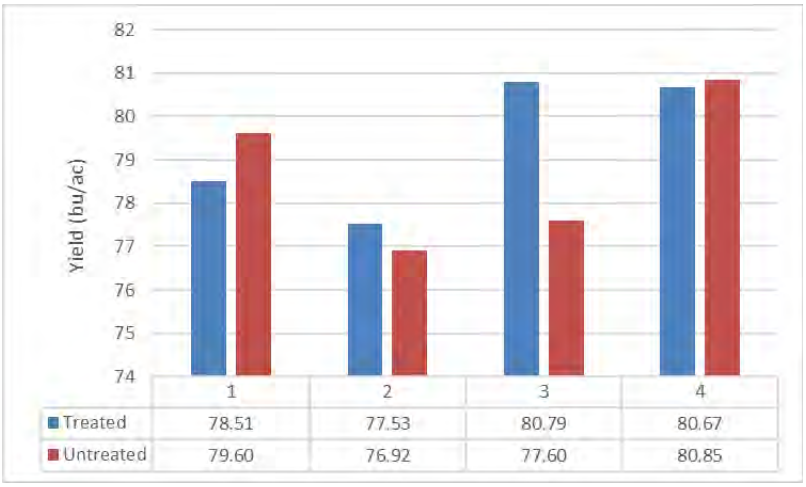
OVERALL YIELD

	Mean (bu/ac)
Treated	79.4[A]
Untreated	78.8[A]
Difference	0.6
P-Value	0.542
CV	2.06%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant yield difference between the seed treatment and the untreated check. There was no significant difference in plant stand due to the use of seed treatment. There was minimal lodging observed within the trial. Rainfall was slightly above normal throughout the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Seed Treatment

Trial ID: 2020-WST04 — R.M. of De Salaberry

Objective: The purpose of this project is to quantify the impacts of seed treatment in wheat.

TRIAL INFORMATION	
Location	St. Pierre
Previous Crop	Soybeans
Soil Texture	Clay
Tillage	Conventional
Planting Date	May 11, 2020
Variety	AC Cardale
Product	Raxil Pro
Row Spacing	10”
Seeding Rate	132 lbs/ac
Fertilizer (N-P-K-S)	120N 40P 10K
Harvest Date	August 21, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	15	105	102	68	**290**
Normal	56	90	61	61	**269**

†Growing season precipitation (mm)

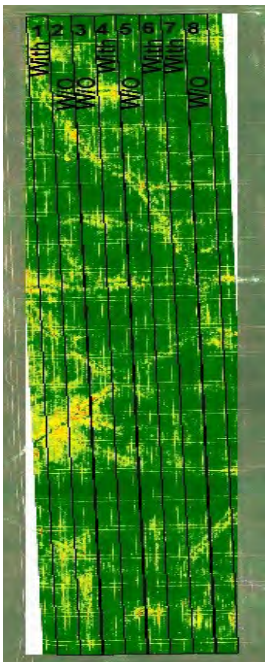
WHEAT RESPONSE

	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
Treated	26[A]	14.2	80	353
Untreated	19[B]	14.3	80	344

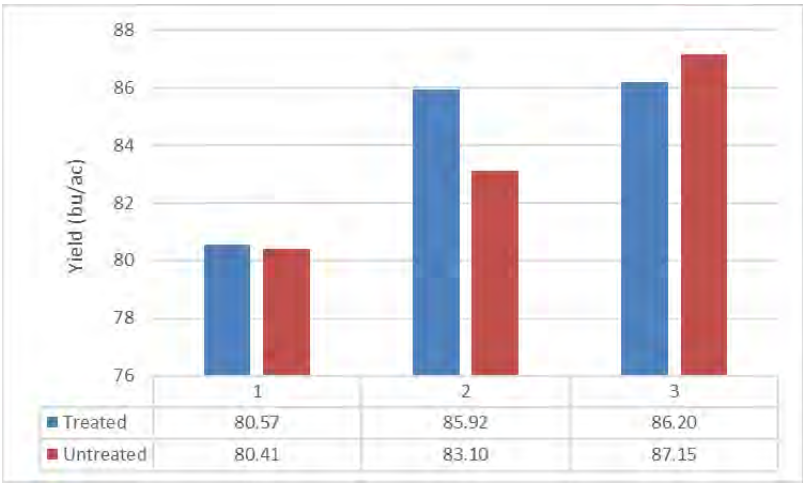
OVERALL YIELD

	Mean (bu/ac)
Treated	84.5[A]
Untreated	83.5[A]
Difference	1.0
P-Value	0.459
CV	3.28%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant yield difference between the seed treatment and the untreated check. There was a significant difference in plant stand due to the use of seed treatment. There was minimal lodging observed within the trial. Rainfall was above normal every month except May.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Seed Treatment

Trial ID: 2020-WST05 — R.M. of St. Clements

Objective: The purpose of this project is to quantify the impacts of seed treatment in wheat.

TRIAL INFORMATION	
Location	Thalberg
Previous Crop	Soybeans
Soil Texture	Clay
Tillage	Conventional
Planting Date	May 12, 2020
Variety	AAC Brandon
Product	Cruiser Vibrance Quattro / Awaken® ST
Row Spacing	10”
Seeding Rate	125 lbs/ac
Fertilizer (N-P-K-S)	130N 50P 50K
Harvest Date	August 27, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	11	75	44	116	**246**
Normal	57	85	68	80	**290**

†Growing season precipitation (mm)

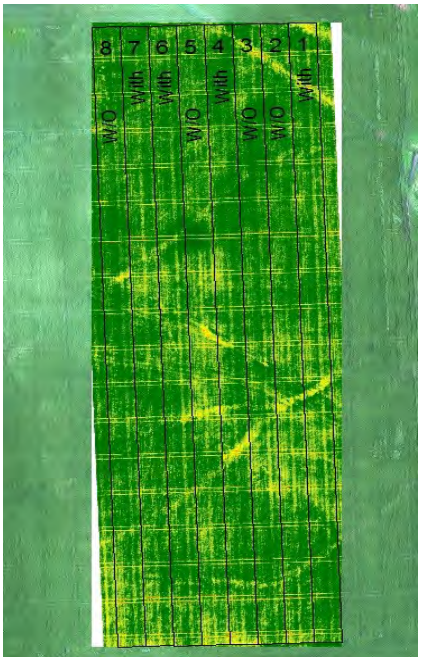
WHEAT RESPONSE

	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
Treated	27[A]	11.5	82	345
Untreated	27[A]	11.6	82	337

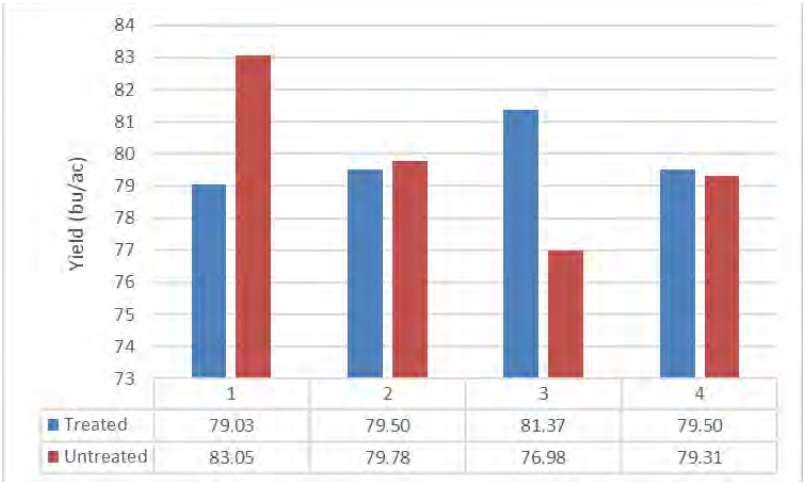
OVERALL YIELD

	Mean (bu/ac)
Treated	79.9[A]
Untreated	79.8[A]
Difference	0.1
P-Value	0.971
CV	2.22%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant yield difference between the seed treatment and the untreated check. There was no significant difference in plant stand due to the use of seed treatment. There was minimal lodging observed within the trial. Rainfall was below normal every month except August.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Seed Treatment

Trial ID: 2020-WST06 — R.M. of Tache

Objective: The purpose of this project is to quantify the impacts of seed treatment in wheat.

TRIAL INFORMATION	
Location	Linden
Previous Crop	Soybeans
Soil Texture	Clay
Tillage	Conventional
Planting Date	May 12, 2020
Variety	AAC Brandon
Product	Insure Cereal FX4
Row Spacing	10”
Seeding Rate	135 lbs/ac
Fertilizer (N-P-K-S)	152N 30P
Harvest Date	August 25, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	11	43	51	89	**193**
Normal	55	86	63	84	**288**

†Growing season precipitation (mm)

WHEAT RESPONSE

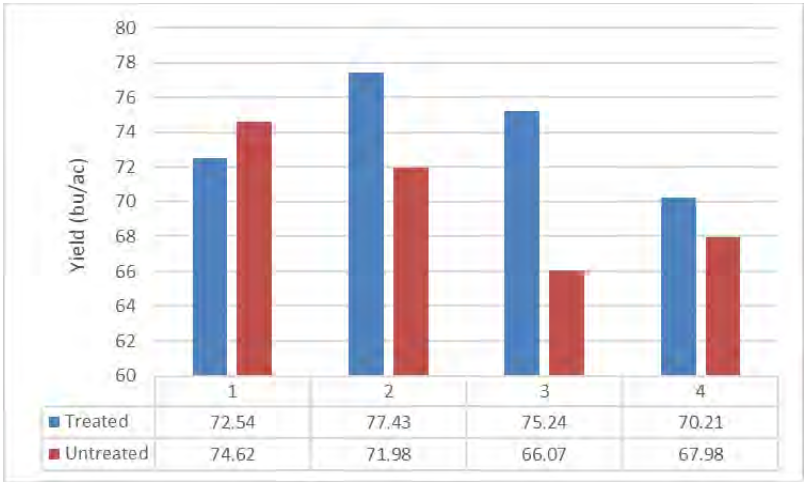
	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
Treated	26[A]	14.3	81	320
Untreated	28[A]	14.1	81	310

OVERALL YIELD

	Mean (bu/ac)
Treated	73.8[A]
Untreated	70.2[A]
Difference	3.6
P-Value	0.22
CV	5.29%
Significance	No

FIELD IMAGE

STRIP YIELD



Summary: There was no significant yield difference between the seed treatment and the untreated check. There was no significant difference in plant stand due to the use of seed treatment. There was minimal lodging observed within the trial. Rainfall was well below normal throughout the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Seed Treatment

Trial ID: 2020-WST07 — R.M. of Dauphin

Objective: The purpose of this project is to quantify the impacts of seed treatment in wheat.

TRIAL INFORMATION	
Location	Dauphin
Previous Crop	Soybeans
Soil Texture	Course Loams
Tillage	Conventional
Planting Date	May 17, 2020
Variety	AAC Viewfield
Product	Raxil Pro
Row Spacing	10”
Seeding Rate	120 lbs/ac
Fertilizer (N-P-K-S)	113N 33P 48K 15S
Harvest Date	September 11, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	32	88	76	104	**299**
Normal	56	81	69	82	**288**

†Growing season precipitation (mm)

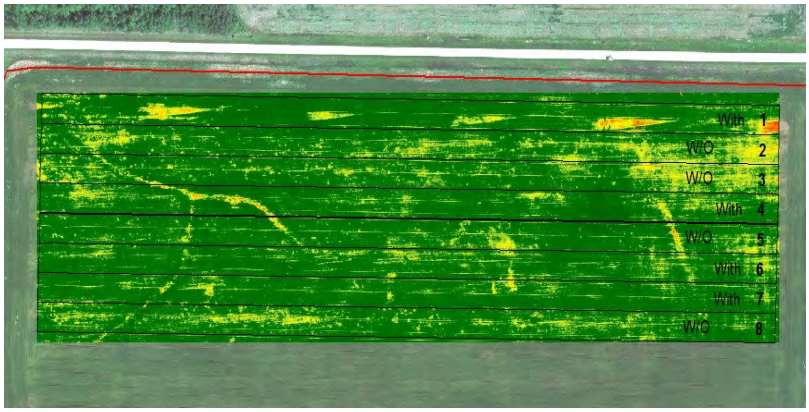
WHEAT RESPONSE

	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
Treated	26[A]	14.0	80	325
Untreated	29[A]	13.9	79	323

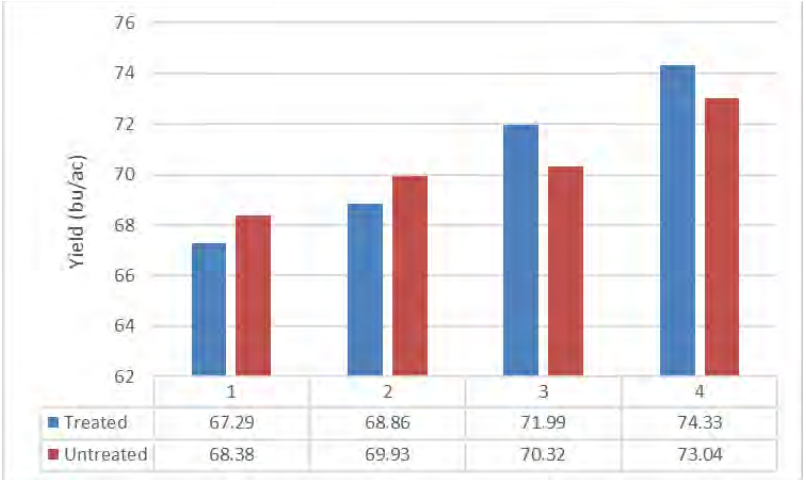
OVERALL YIELD

	Mean (bu/ac)
Treated	70.6[A]
Untreated	70.4[A]
Difference	0.2
P-Value	0.8067
CV	3.44%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant yield difference between the seed treatment and the untreated check. There was no significant difference in plant stand due to the use of seed treatment. There was minimal lodging observed within the trial. Rainfall was close to normal throughout the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Seed Treatment

Trial ID: 2020-WST08 — R.M. of Gilbert Plains

Objective: The purpose of this project is to quantify the impacts of seed treatment in wheat.

TRIAL INFORMATION	
Location	Keld
Previous Crop	Canola
Soil Texture	Clay Loams
Tillage	Zero Tillage
Planting Date	May 26, 2020
Variety	AAC Viewfield
Product	Raxil Pro
Row Spacing	10”
Seeding Rate	120 lbs/ac
Fertilizer (N-P-K-S)	151N 50P 40K
Harvest Date	September 11, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	28	97	82	66	**272**
Normal	56	80	69	112	**317**

†Growing season precipitation (mm)

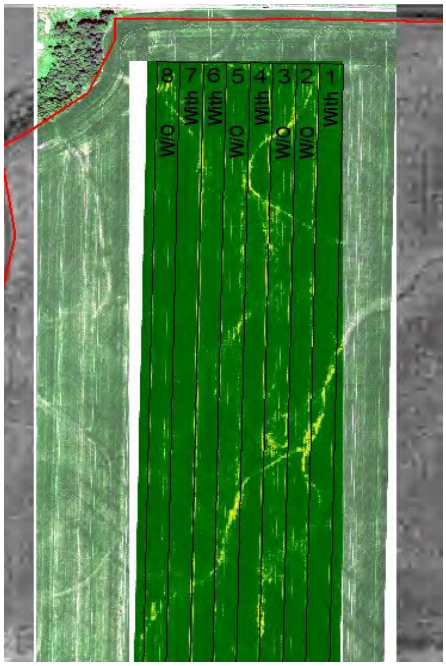
WHEAT RESPONSE

	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
Treated	20[A]	12.8	84	314
Untreated	21[A]	11.6	84	355

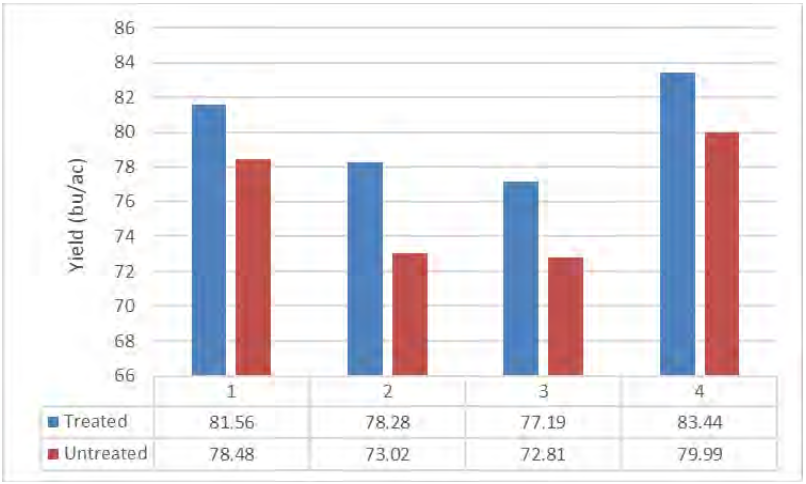
OVERALL YIELD

	Mean (bu/ac)
Treated	80.1[A]
Untreated	76.1[B]
Difference	4.0
P-Value	0.00371
CV	4.81%
Significance	**Yes**

FIELD IMAGE



STRIP YIELD



Summary: There was a significant yield difference between the seed treatment and the untreated check. There was a noticeable visible difference in plant health and vigor throughout most of the growing season between the treatments. There was no significant difference in plant stand due to the use of seed treatment. Rainfall was above normal in June and July and below normal in May and August.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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Wheat Seed Treatment

Trial ID: 2020-WST09 — R.M. of North Norfolk

Objective: The purpose of this project is to quantify the impacts of seed treatment in wheat.

TRIAL INFORMATION	
Location	Austin
Previous Crop	Canola
Soil Texture	Course Loams
Tillage	Minimal Tillage
Planting Date	May 30, 2020
Variety	AAC Brandon
Product	Raxil Pro
Row Spacing	9”
Seeding Rate	114 lbs/ac
Fertilizer (N-P-K-S)	67N 5P 15K
Harvest Date	September 17, 2020

PRECIPITATION†

	May	June	July	Aug	Total
Rainfall	18	45	56	71	**190**
Normal	51	75	64	79	**271**

†Growing season precipitation (mm)

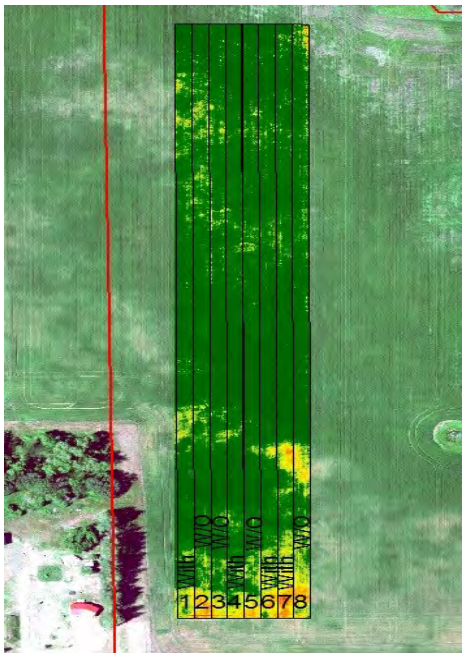
WHEAT RESPONSE

	Plant Stand/ft²	Protein	TWT (kg/hL)	Falling Number
Treated	24[A]	14.6	81	330
Untreated	23[A]	14.2	81	321

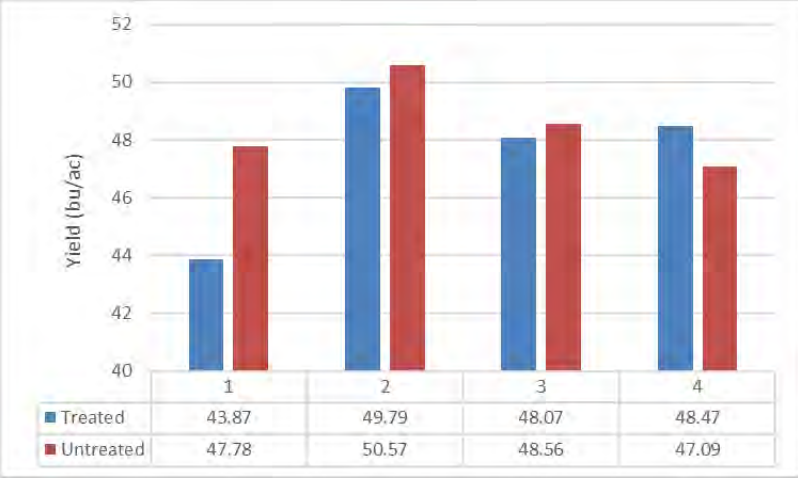
OVERALL YIELD

	Mean (bu/ac)
Treated	47.6[A]
Untreated	48.5[A]
Difference	-0.9
P-Value	0.4041
CV	4.21%
Significance	No

FIELD IMAGE



STRIP YIELD



Summary: There was no significant yield difference between the seed treatment and the untreated check. There was no significant difference in plant stand due to the use of seed treatment. There was minimal lodging observed within the trial. Rainfall was well below normal throughout the growing season.

MCA would like to thank Tone Ag Consulting Ltd. for the research support and SGS Canada Inc. for the wheat quality analysis for this trial.

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NOTES

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WHAT IS THE MPSG ON-FARM NETWORK?

The MPSG On-Farm Network is a network of on-farm research related to pulse and soybean crops that is fully funded and directed by Manitoba Pulse & Soybean Growers. All research in this network is based on three important principles:

1 **PARTICIPATORY** Actively engages farmers in the research process.

2 **PRECISE** OFN trials produce robust and statistically sound data.

3 **PROACTIVE** Results from the OFN guide management decisions, aiming to improve productivity and profitability of the farm operation.

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