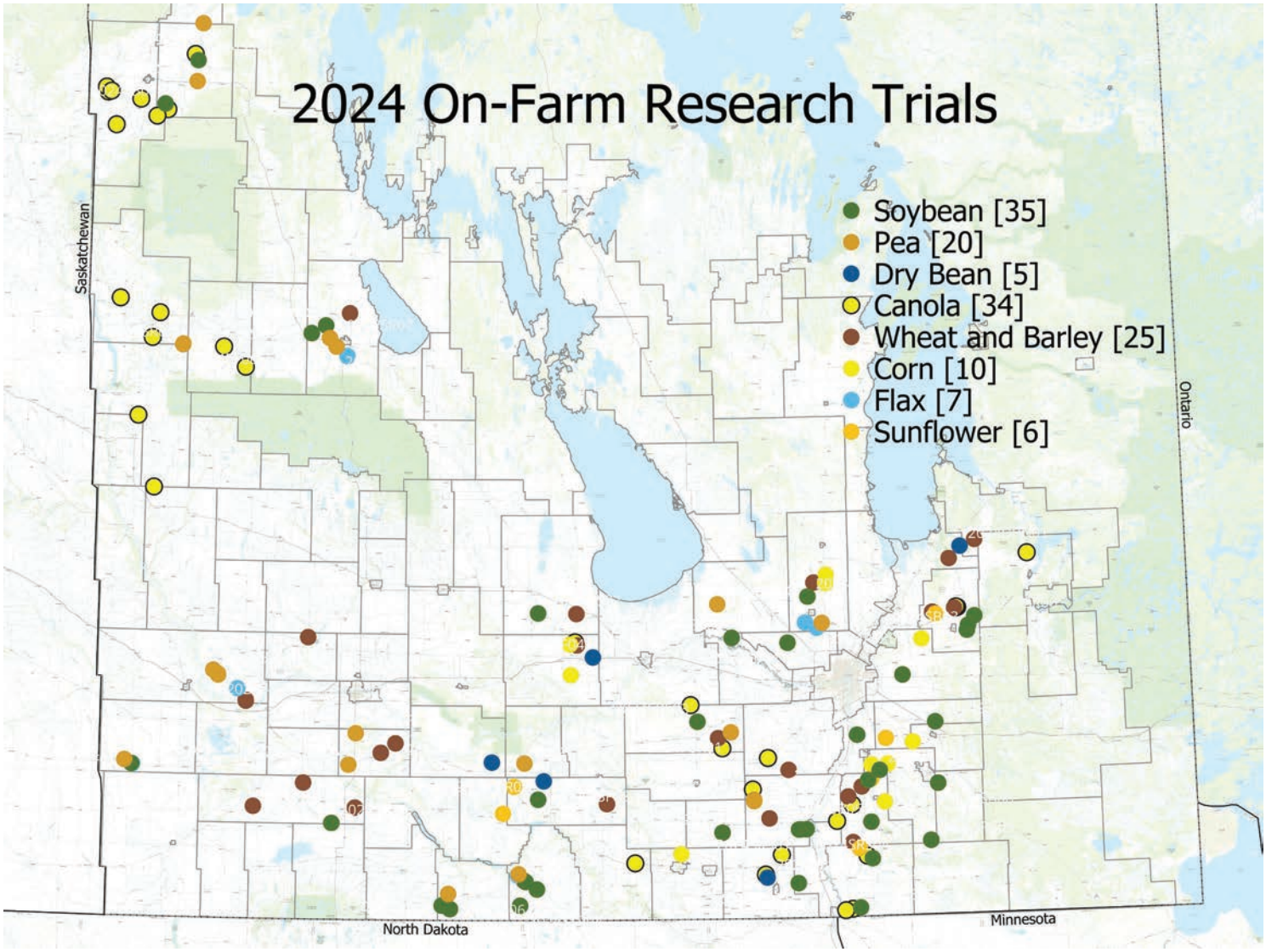
2024

ON-FARM RESEARCH RESULTS

December 2024



2024 On-Farm Research Trial Types

Soybean
- Seeding Rates
- Row Spacings
- Double vs. Single Inoculant
- Single vs. No Inoculant
- Biological Products
- Fungicides
- Iron Chelate

Pea
- Seeding Rates
- Seed Treatments
- Fungicides
- Double vs. Single Inoculant

Dry Bean
- Fungicides

Barley
- Nitrogen Rate and Protein (Malt)
- Seed Treatments
- Seeding Rates

Corn
- Reduced Nitrogen / Biological
- Starter Phosphorus

Flax
- Seeding Rates
- Fungicide Treatment
- Nitrogen Rates

Sunflowers
- Fungicide Treatment

Wheat
- Ultra Early Planting
- Enhanced Efficiency Fertilizer
- Biological Fixing Nitrogen Products
- Reduced Nitrogen / Biological
- Seeding Rates (Winter Wheat)

Canola
- Seeding Rates
- Nitrogen Rates
- Seed-Placed Fertilizer
- Phosphorus Source

Thank you for your participation in on-farm research!

This growing season, with your participation and support, more than 140 on-farm trials were conducted across Manitoba through MPSG and MCA and MCGA. 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 results followed by a growing season weather overview. Within each chapter, organized by crop type, you will find long-term results summaries and summaries of 2024 results for each trial type.

Along with this booklet, additional information is available online. Single-site reports from 2012 to 2024 can be found by following the QR codes below for each organization or by visiting:

- MPSG's On-Farm Network database at manitobapulse.ca/on-farm-research-reports
- MCA's Research on the Farm program at mbcropalliance.ca/research/research-on-the-farm-program
- MCGA's On-Farm Research program at canolagrowers.com/canola-on-farm-research-program

Long-term summary videos of each MPSG trial type are available online and may be viewed at manitobapulse.ca/on-farm-network-results-series or @MBPulseGrowers .

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 Interpreting On-Farm Research Results

Variation in yield is expected within an on-farm trial due to the natural variability that occurs across a field. Statistical analysis allows us to tell if a true yield difference occurred due to a treatment effect (like seeding rate or fungicide application), or if the variation in yield we see at a trial is due to field variability. If results are statistically significant, then we can say with certainty that the treatment caused the yield difference. If the results are not significant, the differences in yield between treatments is due to the variability in the field and not a result of the treatment we were testing.

To achieve statistically-rigorous trials, on-farm field trials are set up using a randomized complete block design (RCBD). Each trial has four to six replicates in the field. 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.

Single-site reports available are based on single-site analysis, i.e., site-years are not combined. Summaries of trial types within this booklet will report a combined analysis across site-years or a frequency of yield responses if combined analyses have not been conducted yet.

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: While a confidence level tells us how certain we are of the results we get from statistical analysis; the p-value indicates if the results are statistically significant. The p-value is a probability that is calculated through the statistical analysis process. A p-value less than 0.05 indicates a statistically significant result, but a p-value greater than 0.05 indicates the results are not significant

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

MPSG, MCA and MCGA do not endorse the use of products tested in on-farm research. Although trials are conducted at multiple sites under varying conditions, your individual results may vary.

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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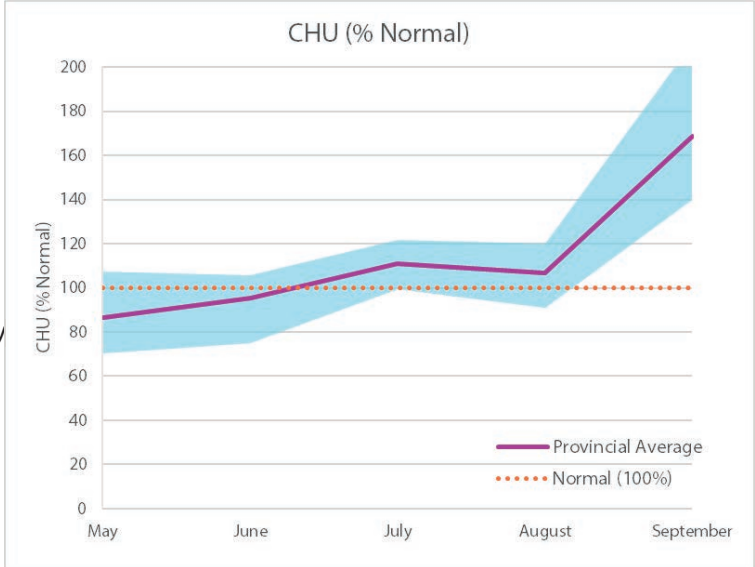
2024 Growing Season Weather

Temperature: May and June were cooler than normal, averaging 90% of normal CHUs and 90% of normal GDD across the province. July was slightly warmer than normal, followed by a near-normal August and an extremely warm September (168% CHUs). On average, 2734 CHU were accumulated from May to September. 2024 had an average frost-free period of 116 consecutive days above -2°C (considered a hard, killing frost).

Precipitation: Overall, rainfall was above normal early in the season for the season (156% normal in May-June), shifting to a drier than normal July-September at 84% of normal. indicated by the blue line on the regional graphs below.

On average, from May to September, each region received:

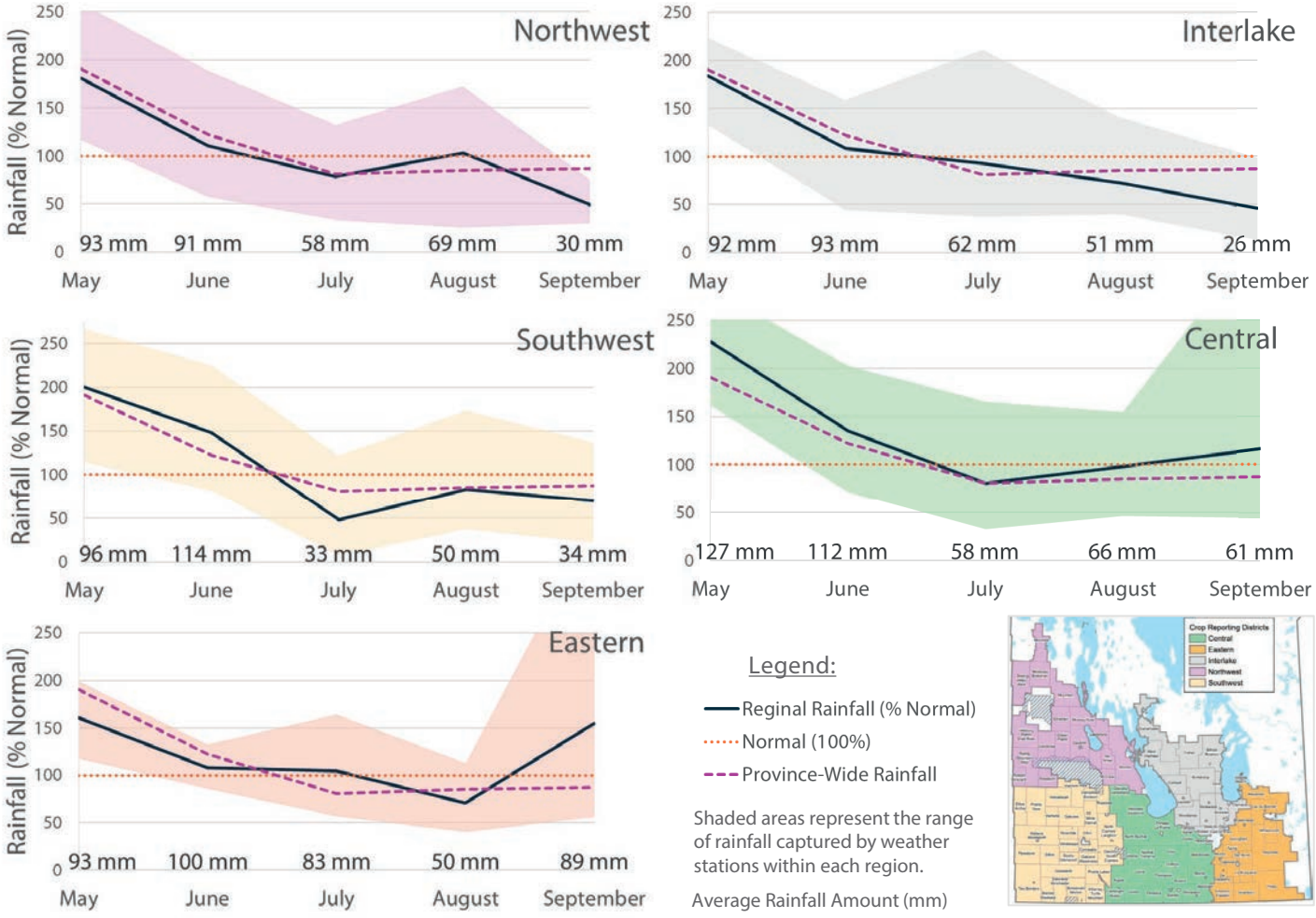
- Northwest: 49-181% of normal rainfall, accumulating 341 mm
- Southwest: 48-200% of normal rainfall, accumulating 327 mm
- Interlake: 46-184% of normal rainfall, accumulating 324 mm
- Central: 81-228% of normal rainfall, accumulating 424 mm
- Eastern: 71-161% of normal rainfall, accumulating 415 mm



Corn Heat Units (CHU) are a measure that accounts for temperatures that are too cool (<10°C during the day and <4.4°C overnight) and too hot (>30°C) for crop growth.

Weather Extremes:

- 12 wind events >100 km/hr – 5 occurred on June 16 early a.m. in western MB.
- 6 rain events >3" (5 in SE-Central on Sep 17-18 and 1 in Winkler on Jul 2 (Canada Day storm). 2 additional rain events >3" over May 24 to 25 at Winkler and Jordan Corner.
- In Jul/June, weather stations on avg had 9.5 days >28°C (range: 2-20 days >28°C)



Data Source: Manitoba Agriculture

2024 ON-FARM RESEARCH RESULTS

on-farm network

MANITOBA PULSE & SOYBEAN GROWERS

Manitoba Pulse & Soybean Growers On-Farm Network

In today's era of high input costs, low margins and the ever-increasing need to improve sustainability of the farm operation, validating agronomic management decisions made on-farm are ever-more important. Agronomic recommendations are usually generated by small-plot research, which can efficiently and effectively compare numerous treatments in the same location, at the same time. But what happens when those treatments are used at a field scale? Do they behave the same? Are they just as effective? Are they economical? On-farm trials can help answer these questions.

On-farm research is done by the farmer, for the farmer. Well-conducted on-farm trials investigate questions and outcomes on a case-by-case basis while evaluating the overall effects of management decisions through combining data across trial locations and years.

Facilitating trials to generate meaningful results is a balance between our efforts and farmer efforts. For farmers, there is time involved in conducting the trials on-farm, particularly at seeding and harvest, two of the busiest times of the growing season. But this investment of time generates valuable information on the agronomics and economics of different management practices and products. Results from on-farm trials can be used to shift management practices or validate current practices on individual farms, but they can also be pooled together across space and time to gain an overall, big-picture understanding of the impact of a treatment or decision.

This would not be possible without you, our farmer collaborators. Thank you for your dedication to these trials!

Thank-you to our On-Farm Network collaborators:

- Farmer-members
- Tone Ag Consulting
- New Era Ag Research
- Green Aero Tech
- Assiniboine College
- BASF
- UPL
- Corteva
- Bayer Crop Science

Explore MPSG's On-Farm Network Trial Database

on-farm network
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Interested in Participating in 2025?

Trial Topics:

- Seeding rates
- Row spacings
- Inoculant strategies
- Seed treatments
- Fungicides
- N rates in dry beans
- Biological products
- Tillage and residue management

Have a different trial idea? Let us know!

Contact Chris Forsythe, On-Farm Network Agronomist
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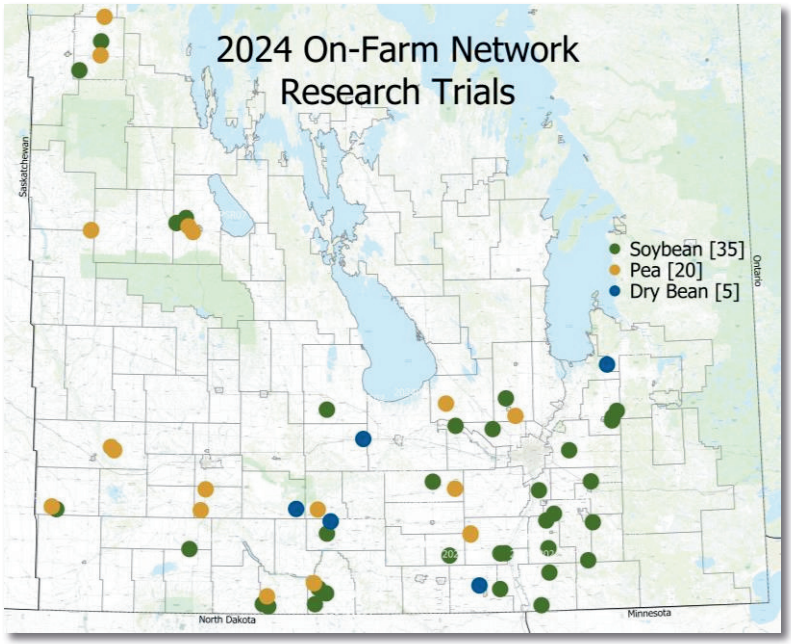

MANITOBA Pulse Soybean GROWERS

Soybean Seeding Rate Trials

Evaluating different soybean seeding rates on-farm

2024 Results

on-farm network
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Trial Information:

- 12 soybean seeding rate trials in 2024 tested the farm's normal seeding rate vs. +/- 30,000 seeds/ac.

Supporting Data:

- Plant counts were recorded during vegetative (V) and reproductive (R) stages.
- Average early-season establishment was 81% (range: 61–107%) and average late-season survivability was 78% (range: 55–108 %).

Yield and Economic Results:

- There were significant yield differences at two of the twelve soybean seeding rate trials (Figure 1), however, only one was economical where the yield increase was large enough to pay for the increased seed cost.
  - At SSR06 the yield of the high seeding rate was 2.2 bu/ac more than the low seeding rate but a loss in profit of $6.92/ac occurred (assuming a seed cost of $90/ac and a selling price of $11.77/bu).
  - At SSR12 the yield of the high seeding rate was 3.3 bu/ac higher than the low seeding rate and increase in profit of $12.32/ac occurred. (assuming a seed cost of $90/ac and a selling price of $11.77/bu).
- Most frequently, seeding rates tested differed by 30,000 and 60,000 seeds/ac, resulting in a loss in profit of $13.49/ac and $26.97, respectively, when compared to the lowest seeding rate tested.

Trial ID	Germ. (%)	Seeding Rates Tested	Plant Stands at V Stages	Plant Stands at R Stages	Yield Difference?	p-value
SSR01	83	113 vs.143 vs. 173	89 vs. 111 vs. 135	89 vs. 110 vs. 124	No	*0.177*
SSR02	73	120 vs. 150 vs.180	76 vs. 105 vs. 117	66 vs. 101 vs. 113	No	*0.079*
SSR03	91	125 vs. 155 vs. 185	95 vs. 110 vs. 135	86 vs. 102 vs. 128	No	*0.088*
SSR04	97	120 vs. 150 vs. 180	121 vs. 137 vs. 162	118 vs. 132 vs. 145	No	*0.126*
SSR05	82	149 vs. 179 vs. 209	90 vs. 117 vs. 130	83 vs. 105 vs. 120	No	*0.669*
SSR06	84	144 vs. 181 vs. 217	103 vs. 128 vs. 159		**Yes**	***0.023***
SSR07	81	105 vs. 135 vs. 165	102 vs. 105 vs. 112	100 vs. 102 vs. 106	No	*0.312*
SSR08	90	160 vs. 190 vs. 220	127 vs. 149 vs. 144	119 vs. 136 vs. 132	No	*0.931*
SSR09	96	150 vs. 180 vs. 210	161 vs. 178 vs. 219	162 vs. 175 vs. 216	No	*0.787*
SSR10	91	120 vs. 150 vs. 180	107 vs. 133 vs. 157	108 vs. 127 vs. 152	No	*0.983*
SSR11	89	100 vs. 140	87 vs. 123	86 vs. 122	No	*0.513*
SSR12	90	155 vs. 185 vs. 214	131 vs. 156 vs. 171	137 vs. 144 vs. 176	**Yes**	***0.024***

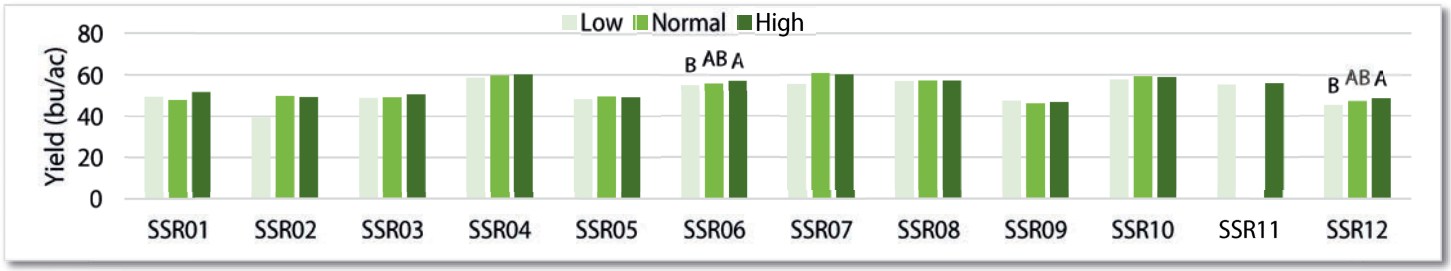

Figure 1. Average yields for each seeding rate treatment (low, normal and high) tested at 12 on-farm trials in 2024. Different letters above graph bars indicate where significant yield differences ($p<0.05$) were found between high and low seeding rate treatments.

MANITOBA Pulse Soybean GROWERS

Soybean Seeding Rate Trials

Evaluating different soybean seeding rates on-farm

Long-term Results (2012 – 2024)

on-farm network
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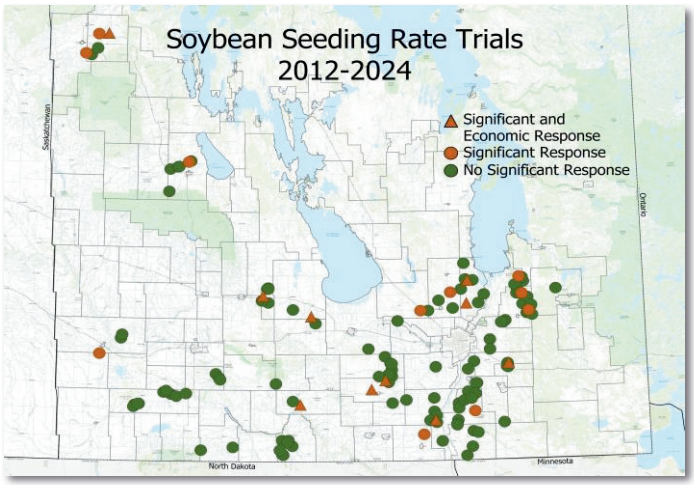
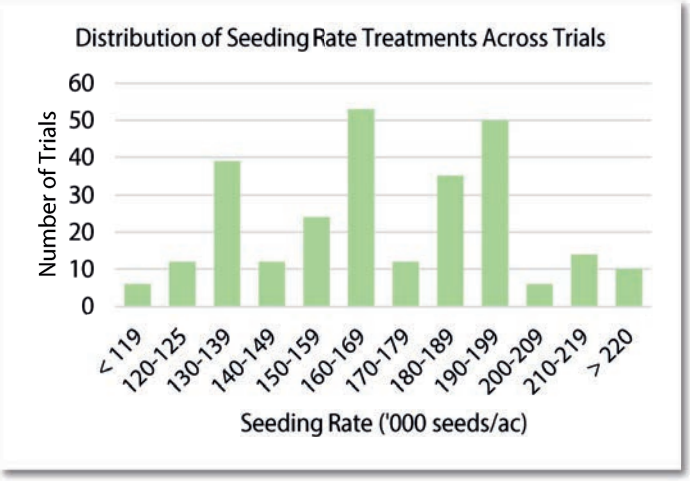
Trial Information:

- 132 trials from 2012 to 2024.
- Seeding rates tested are the farmer's traditional practice vs. 30,000 seeds/ac higher and lower.
- All other crop management activities are the same (row spacing, weed control, fertility, etc.).
- Most common comparisons have been 130 vs. 160 vs. 190,000 seeds/ac and 150 vs. 180 vs. 210,000 seeds/ac.
- Equipment: 58% of trials have used an air seeder and 42% have used a planter.
- Row spacings: 51% on narrow rows (7–12"), 31% on intermediate rows (15–20") and 18% on wide rows (22–30").



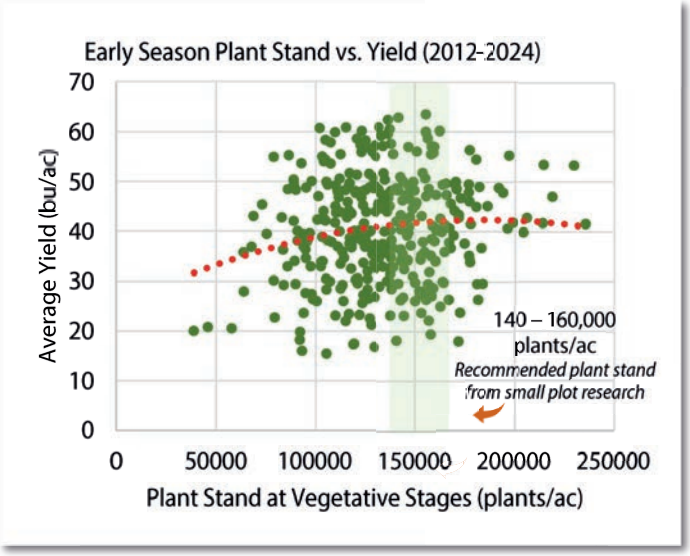
Supporting Data:

- Plant counts are recorded during V-stages and R-stages.
- Average early-season establishment has been 81% (range: 31–119%) and average late-season survivability has been 76% (range: 26–122%).
- Higher seeding rates were typically associated with lower percent establishment and more mortality throughout the growing season.
- Average survivability with planters has been 82% and 80% with seeders.



Yield Results:

- 84% of the time, changing soybean seeding rate has not changed soybean yield.
- There have been 21 trials where a significant yield response occurred (16% of the time). Of those responses, 15 were economical where the yield increase was large enough to pay for the increased seed cost (81% of the time).
- Environment has played the biggest role in determining soybean yield in these trials.
- The outcome of seeding rates and the resulting plant stands established in the field have been farm-specific.



Recommendations from this Research:

- Evaluate living plant stands in every field, every year and relate those plant counts back to your seeding rate. Are there areas where you can improve survivability on your farm? (Survivability (%) = plant count / seeding rate)
- Seeding rates of 150 to 190,000 seeds/ac have maintained soybean yield in these trials.

View trial reports here

MANITOBA Pulse Soybean GROWERS

Soybean Row Spacing Trials

Evaluating different soybean row widths on-farm

2024 Results

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Trial Information:

- Five trials testing different row spacings were established in 2024.
  - One trial compared 7.5" and 15" rows (SRS01), one trial compared 10" and 20" rows (SRS06) and three trials compared 15" and 30" rows (SRS02, SRS03 and SRS05).
  - Seeding rates were the same for both row widths being compared and ranged from 140,000 to 168,000 seeds/ac.

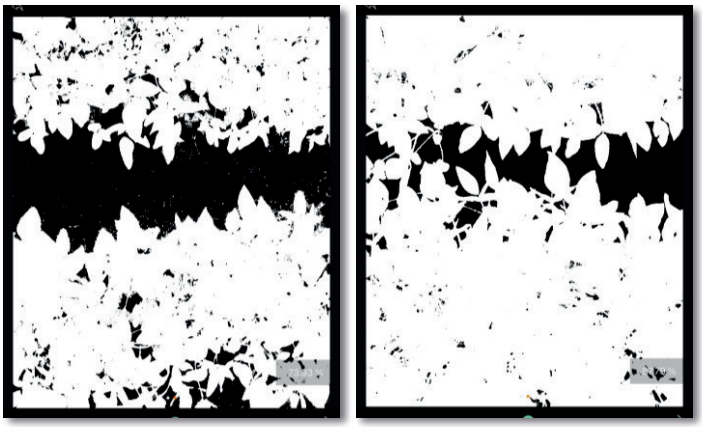

Figure 1. *Canopeo* app uses photographs to assess percent crop canopy closure between the rows. In the above images, there were canopy cover values of 75% (L) and 88% (R) at R3 growth stage.

Supporting Data:

- Plant counts were recorded during V- and the same areas revisited at R-stages. Average late season survivability was similar between narrow (7.5" –10"), intermediate (15" – 20") and wide row (30") spacings.
- Canopy closure was evaluated at R1, R3 and R5 growth stages using the *Canopeo* app to assess % canopy cover. There were no differences in canopy closure between 7.5" and 15" nor 10" and 20" row spacings at any stage, but 15" rows had an average of 8.2% more canopy cover at R3 than 30" rows (Figure 1).
- In 2024, disease pressure was additionally evaluated. There were no differences between row spacings except at SRS02 where the 15" rows had higher septoria brown spot severity than the 30" rows.

Yield Results:

- There was a 3.2 bu/ac yield advantage for soybeans planted on wide (30") over intermediate (15") rows at SRS05.
- There were no significant differences in yield at SRS01, SRS02, SRS03 and SRS06.
- Economics of these trials are difficult to quantify since it is very farm- and equipment-specific in how differences in row width are achieved.

		Row Spacing (in)		Canopy Cover (%) R3		---- Yield (bu/ac) ----		---- Statistics ----		
Trial ID	Seeding rate (seeds/ac)	NR[1]	WR[2]	NR	WR	NR	WR	Yield difference?	p-value	CV%
SRS01	150,000	7.5	15	99 a	99 a	53.6	53.5	No	*0.959*	*3.3*
SRS02	140,000	15	30	**92 a**	**81 b**	44.5	39.2	No	*0.168*	*9.8*
SRS03	150,000	15	30	**88 a**	**76 b**	56.9	51.5	No	*0.077*	*5.3*
SRS05	140,000	15	30	**99 a**	**95 b**	**39.2 B**	**42.5 A**	**Yes**	***0.042***	***3.3***
SRS06	168,000	10	20	84 a	76 a	41.5	37.2	No	*0.059*	*4.8*

[1] NR = Narrow row
[2] WR = Wide row
Values within rows followed by different letters are significantly different ($p < 0.05$)

Soybean Row Spacing Trials

Evaluating different soybean row widths on-farm

Long-term Results (2019 – 2024)

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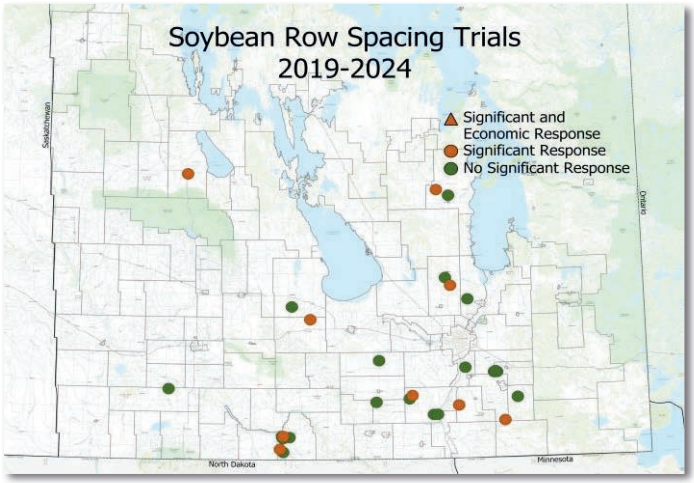
Trial Information:

- 26 trials from 2019 to 2024.
- Seeding rates are the same for both row widths.
- 12 trials tested narrow (7.5"–10") vs. intermediate (15"–20") rows and 14 trials tested intermediate (15") vs. wide (30") rows.

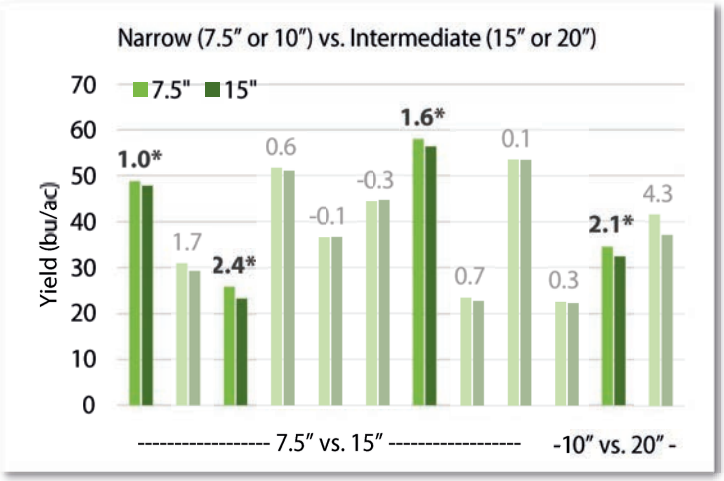


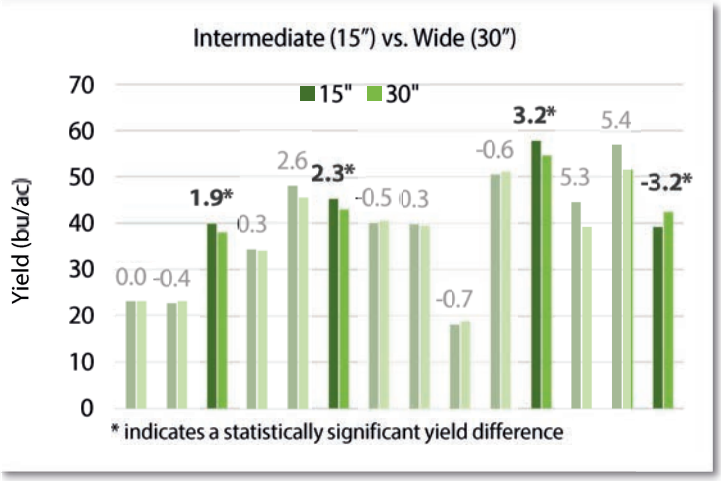
Supporting Data:

- Plant counts are recorded during V-stages and R-stages.
- Average early-season survivability has been 85% for 7.5" rows, 82% for 15" rows and 78% for 30" rows.
- Wide rows were typically associated with lower percent survivability and more mortality throughout the growing season (4% on average) due to increased competition within the row.
- Canopy closure is assessed at R1, R3 and R5 growth stages using the *Canopeo* app to assess percent canopy cover.
- Narrow and intermediate row widths close earlier in the season than wide row widths, improving crop competitive ability against weeds.

Yield Results:

- Overall, 73% of the time row spacing had no effect on yield.
- Narrow rows improved yield over intermediate rows 33% of the time, increasing yield by 1.8 bu/ac on average.
- Intermediate rows improved yield over wide rows 21% of the time, increasing yield by 2.5 bu/ac on average, however, in one trial, the 30" row width had a 3.2 bu/ac advantage over the 15" rows.





Recommendations from this Research:

- Soybeans may be grown successfully at any row spacing, however, there is greater yield potential with narrower rows.
- A yield response to row spacing is complex and unpredictable suggesting other factors such as equipment cost should weigh on the decision to change row spacings.
- Different varieties display different growth habits at various row spacings and this likely influences a yield response.
- Though yield responses may not occur every year on every farm, the competitive advantage of a crop canopy that closes earlier in the season is important to mitigating the development of herbicide-resistant weeds.

View trial reports here

MANITOBA Pulse Soybean GROWERS

Soybean Double Inoculant Trials

Comparing double vs. single inoculation strategies

2024 Results

on-farm network
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Trial Information:

- Three trials in 2024 compared a double (granular or peat in-furrow + liquid on-seed) vs. single (liquid on-seed alone) inoculant strategies.
- These trials usually require a minimum field history of two previous soybean crops and the most recent soybean crop within the last four years.
- However, one trial (S2IN02) does not meet these requirements.

Supporting Data:

- Nodulation is rated at flowering (R1–R2) by counting the number of pink, active nodules per plant using a 0–4 scale:
  - 0 (None) = 0 nodules/plant
  - 1 (Poor) = 1–4 nodules/plant
  - 2 (Fair) = 5–9 nodules/plant
  - 3 (Good) = 10–19 nodules/plant
  - 4 (Excellent) = 20 or more nodules/plant
- There were no differences in nodulation between inoculation strategies in 2024.

Yield and Economic Results:

- There were no significant yield differences between double (2x) and single (1x) inoculation strategies on-farm in 2024.
- Assuming a cost of $10/ac for the additional granular inoculant, there was a loss in profit of $10/ac with a double inoculation strategy.

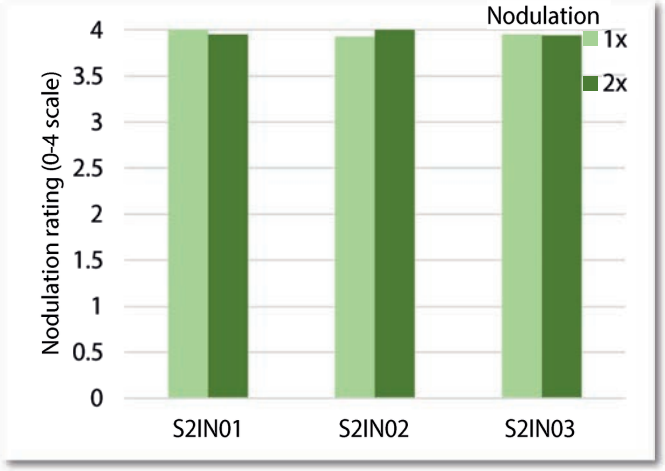

Figure 1. Average nodulation ratings of single (1x) and double (2x) inoculant strategies.

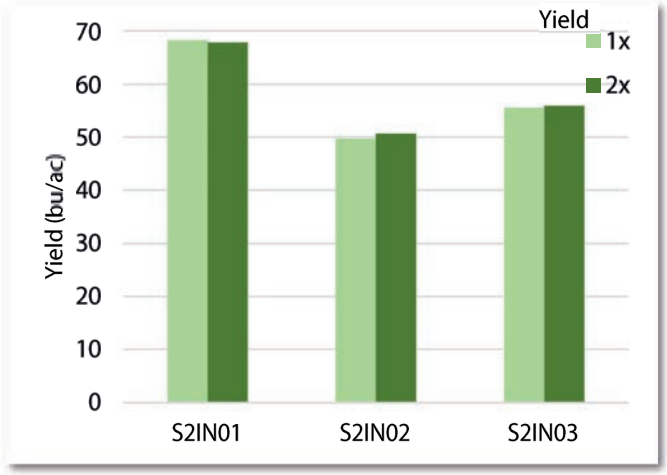

Figure 2. Yields (bu/ac) of single (1x) and double (2x) inoculant strategies.

	History		Average Nodulation Rating					Statistics	
TrialID	# previous soybean crops	years since last soybean crop	1x	2x	Nodulation Difference?	p-value	Yield Difference?	p-value	CV (%)
S2IN01	3	3	4	4	No	*0.182*	No	*0.874*	*4.8*
S2IN02[1]	1	6	3.9	4	No	*0.297*	No	*0.176*	*1.5*
S2IN03	4	3	4	3.9	No	*0.638*	No	*0.564*	*1.5*

[1] This trial does not meet the requirement of at least two previous soybean crops and one within the last four years. It will therefore be excluded from long-term datasets.

MANITOBA Pulse Soybean GROWERS

Soybean Double Inoculant Trials

Comparing double vs. single inoculation strategies

Long-term Results (2013 – 2024)

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Trial Information:

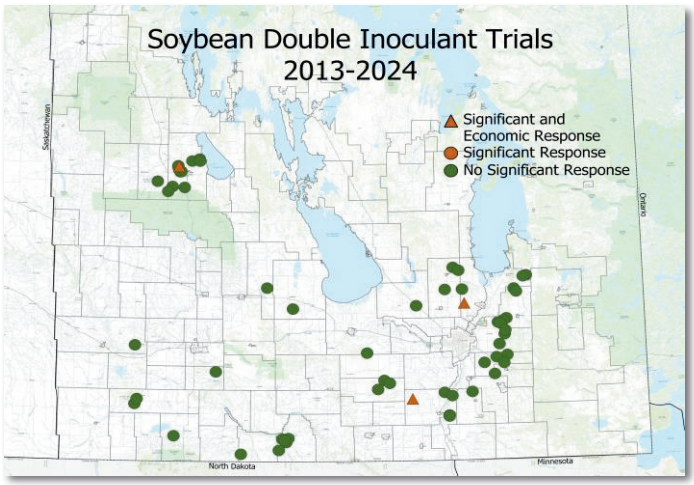
- 58 trials were conducted from 2013 to 2024.
- Treatments compared double (granular or peat in-furrow + liquid on-seed) vs. single (liquid on-seed alone) inoculant strategies.
- These trials require a minimum field history of two previous soybean crops and the most recent soybean crop within the last four years.

Supporting Data:

- Nodulation is rated at flowering (R1–R2) by counting the number of pink, active nodules per plant using a 0–4 scale:
  - 0 (None) = 0 nodules/plant
  - 1 (Poor) = 1–4 nodules/plant
  - 2 (Fair) = 5–9 nodules/plant
  - 3 (Good) = 10–19 nodules/plant
  - 4 (Excellent) = 20 or more nodules/plant
- Nodulation ratings at flowering were similar between single and double inoculant strips at 96% of trials.

Yield Results:

- 95% of the time, an additional granular or peat in-furrow inoculant did not improve soybean yield over liquid on-seed inoculant alone, resulting in a loss of roughly $10/ac.
- There have been three trials where a significant yield response occurred (5% of the time). Of those responses, all three were economical, where the yield increase was large enough to pay for the increased seed cost (1.5–3.0 bu/ac increase).



Soybean History (Number of Previous Soybean Crops)	Number of Trials
2 crops	36 (63%)
3 crops	14 (25%)
4 crops	4 (7%)
5 or more crops	3 (5%)

Years Since Inoculant Last Applied	Number of Trials
1 year	12 (21%)
2 years	15 (26%)
3 years	20 (34%)
4 years	11 (19%)

Recommendations from this Research:

- Choose a soybean inoculation strategy based on field history. Consider a single inoculation strategy if the:
  - ✓ field has had at least two previous soybean crops,
  - ✓ previous soybean crops have been well nodulated,
  - ✓ most recent soybean crop was within the past four years, and the
  - ✓ field has had no significant flooding or drought.
- Granular in-furrow inoculants will have more resiliency and longevity in the soil in years with challenging spring conditions (excessive moisture or drought).

View trial reports here

MANITOBA Pulse Soybean GROWERS

Soybean Single Inoculant Trials

Comparing a single inoculation strategy vs. none

2024 Results

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

- Two trials in 2024 compared a single inoculant (1x) strategy vs. no inoculant (0x).
    - At S1IN01 the inoculant form used was liquid on-seed and at S1IN02, a granular in-furrow inoculant was applied.
- These fields have had a field history of at least five previous soybean crops and the most recent soybean crop within the last four years.

Supporting Data:

- Nodulation was rated at flowering (R1–R2) by counting the number of pink, active nodules per plant using a 0–4 scale:
    - 0 (None) = 0 nodules/plant
    - 1 (Poor) = 1–4 nodules/plant
    - 2 (Fair) = 5–9 nodules/plant
    - 3 (Good) = 10–19 nodules/plant
    - 4 (Excellent) = 20 or more nodules/plant
- Nodulation ratings at flowering were the same between single and no inoculant strips at both trials in 2024.

Yield and Economic Results:

- There were no yield differences between soybeans without inoculant and a single inoculant strategy.
- As a result, there is an estimated loss in profit equivalent to the cost of the on-seed inoculant (-$3.00/ac) or granular in-furrow inoculant (-$10.00/ac).

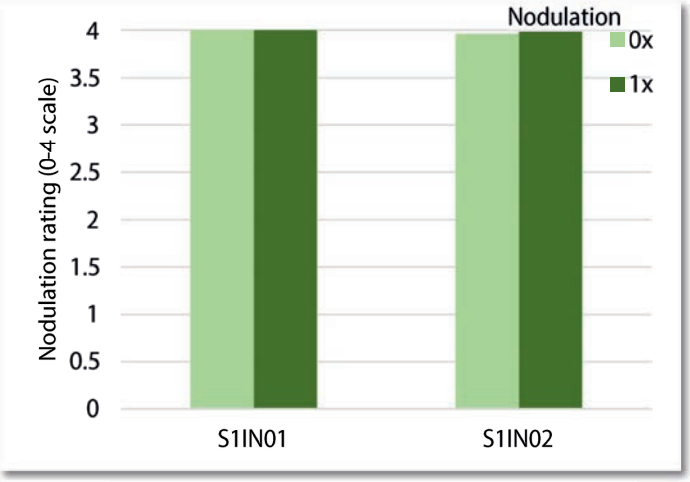


Figure 1. Average nodulation ratings of no inoculant (0x) and single inoculant (1x) strategies.

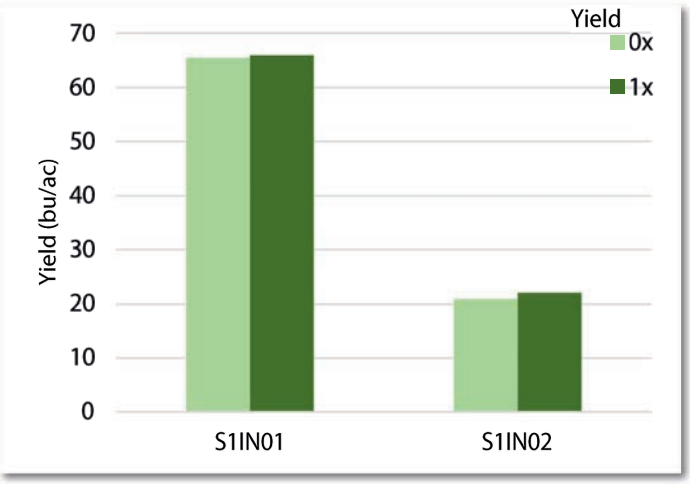


Figure 2. Yields (bu/ac) of no inoculant (0x) and single inoculant (1x) strategies.

TrialID	R.M.	History: # previous soybean crops	History: years since last soybean crop	Avg Nod. Rating: 0x	Avg Nod. Rating: 1x	Nodulation Difference?	Yield Difference?	Statistics: p-value	Statistics: CV (%)
S1IN01	Hanover	5+	3	4	4	No	No	*0.524*	*1.3*
S1IN02	Brokenhead	10	4	3.96	3.99	No	No	*0.079*	*2.0*

MANITOBA Pulse Soybean GROWERS

Soybean Single Inoculant Trials

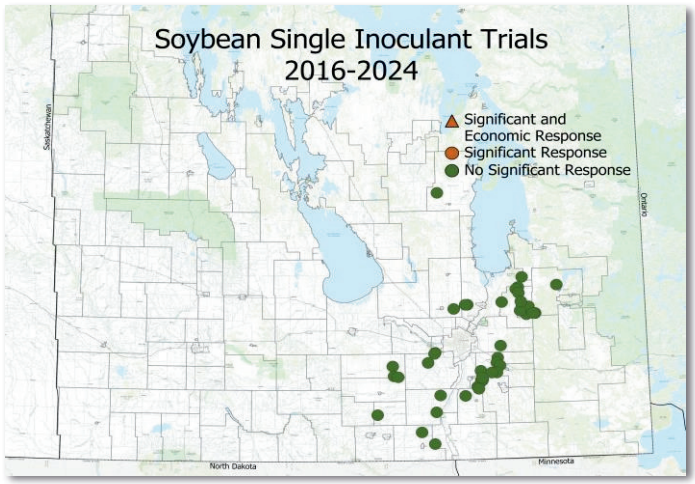
Comparing a single inoculation strategy vs. none

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Long-term Results (2016 – 2024)

Trial Information:

- 44 trials were conducted from 2016 to 2024.
- Treatments compared a single (typically liquid or peat on-seed) inoculant strategy vs. no inoculant applied at all.
  - 90% of trials testing liquid on-seed and 10% using peat on-seed.
- These trials require a minimum field history of three previous soybean crops and the most recent soybean crop within the last four years. Therefore, to date, these trials have occurred in central Manitoba where there is more soybean field history.



Supporting Data:

- Nodulation is rated at flowering (R1–R2) by counting the number of pink, active nodules per plant using a 0–4 scale:
  - 0 (None) = 0 nodules/plant
  - 1 (Poor) = 1–4 nodules/plant
  - 2 (Fair) = 5–9 nodules/plant
  - 3 (Good) = 10–19 nodules/plant
  - 4 (Excellent) = 20 or more nodules/plant
- Nodulation ratings at flowering were similar between single and no inoculant strips at 95% of trials.

Soybean History (Number of Previous Soybean Crops)	*Number of Trials*
3 crops	17 (%)
4 crops	12 (%)
5 crops	8 (%)
6 or more crops	6 (%)

Yield Results:

- A single inoculation strategy has never improved soybean yield on fields in Central Manitoba with more than three previous soybean crops.
- Assuming a cost of $3/ac for liquid inoculant, and a soybean sell price of $12/bu, a consistent yield increase of 0.25 bu/ac is needed to pay for the inoculant. Overall, the average yield difference has been 0.01 bu/ac between single vs. no inoculant treatments.

Years Since Inoculant Last Applied	*Number of Trials*
1 year	11 (25%)
2 years	10 (23%)
3 years	16 (36%)
4 years	7 (16%)

Recommendations from this Research:

- Naturalized populations of *Bradyrhizobium japonicum* are effectively colonizing root nodules and fixing nitrogen in fields with sufficient soybean history.
- Although yield responses have not occurred to date on soybean fields with more than three previous soybean crops, at a cost of roughly $3.00/ac, liquid on-seed inoculant may provide peace of mind knowing the crop's N requirements are secured.

View trial reports here

MANITOBA Pulse Soybean GROWERS

Soybean Biological Trials

Evaluating different biological products on-farm

2024 Results

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

- Eight trials in 2024 tested three different biological products:
  - *Crop Aid Plus* is a foliar applied bio-stimulant meant to maximize the availability of applied fertilizer.
  - *Primacy Alpha* is a foliar applied bio-stimulant that aims to stimulate uptake of nutrients.
  - *Envita* is a liquid nitrogen-fixing biological that aims to supply plants with an additional source of nitrogen.
- *Primacy Alpha* was applied at V2 at a rate of 475mL/ac.
- *Envita* was applied at V1 to V3 at rate of 40 ac/jug.
- *Crop Aid Plus* was applied at V2 at a rate of 40ac/jug.

Figure 1. Biological crop inputs were tested in the trial pictured above. Plant biologicals are naturally derived products that, among other things, aim to enhance nutrient uptake.

Supporting Data:

- The goal of these trials is first and foremost to assess the impact of various biological products on yield. As a result, the only supporting data collected are to determine living plant stands.
- There were no significant differences between plant stands of treated and untreated soybeans.

Yield and Economic Results:

- There were no soybean yield responses to the biological products tested in 2024.
- As a result, there was a loss in profit equivalent to the cost of these products ($14.50/ac for *Envita*, $5.00/ac for *Crop Aid Nutrition and $8.50/ac for Primacy Alpha*) plus application costs.

			------- Plant Stand-------		------ Yield (bu/ac) ------		---------- Statistics ----------		
Trial ID	App. Date	Product	Untreated	Treated	Untreated	Treated	p-value	CV (%)	Significant?
SB01	June 12	Envita (liquid)	133,000	126,875	63.8	63.5	*0.719*	*2.1*	No
SB02	June 17	Envita (dry)	110,534	111,841	53.1	54.3	*0.073*	*1.1*	No
SB03	June 26	Crop Aid Plus/Crop Aid Plus + Envita/Envita[1]	195,685	224,725[2]	44.6	45.7[2]	*0.417*	*2.7*	No
SB04	June 27	Envita (liquid)	121,968	117,612	57.9	58.5	*0.645*	*3.0*	No
SB05	June 27	Envita (liquid)	141,100	152,000	51.9	51.9	*0.908*	*2.6*	No
SB06	July 4	Envita (liquid)	127,667	123,250	32.2	32.3	*0.950*	*4.0*	No
SB07	June 14	Primacy Alpha	100,667	110,750	38.5	40.1	*0.390*	*7.3*	No
SB08	June 25	Envita (liquid)	109,750	101,250	44.0	44.7	*0.543*	*3.1*	No

[1] At SB03 three treatments were tested: 1. Crop Aid Plus, 2. Crop Aid Plus + Envita and 3. Envita. The products tested yielded 45.97, 46.03 and 46.2 bu/ac respectively.
[2] Average plant stand and yield of the three different products tested.

Soybean Biological Trials

Evaluating different biological products on-farm

Long-term Results (2019 – 2024)

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

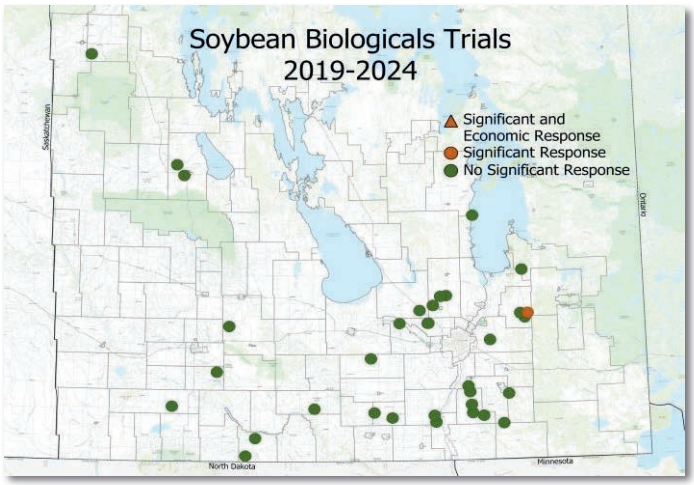
- 33 trials have compared an application of a biological product vs. untreated soybeans on-farm from 2019 to 2024.
- Biological products are chosen by the farmer and applied according to label recommendations.
- 12 products have been tested to-date (see table).

Supporting Data:

- The goal of these trials is first and foremost to assess the impact of various biological products on yield. As a results, the only supporting data collected are to determine living plant stands.

Yield Results:

- Yield has not been increased with the biological products we have tested on-farm to-date.
- There has been one, negative yield response where the application of *Crop Aid Foliar* reduced soybean yield by 1.8 bu/ac.
- These biological products cost anywhere from $5 to $28/ac. With no yield improvements, there has been a loss in profit equivalent to the product cost.



Biological Product	*Number of Trials*	*Yield Response?*
Envita	15	No
Fertiactyl	5	No
OHM	3	No
Humic Acid	1	No
Primacy Alpha	2	No
EZ Gro Prime	1	No
Active Flower	1	No
HeadsUp ST	1	No
ACF-SR In-furrow	1	No
Crop Aid Soil	1	No
Crop Aid Foliar	1	Yes, negative
Crop Aid Plus	1	No

Recommendations from this Research:

- There are a lot of biological products entering the market, all with different claims to promote plant or soil health.
- The best course of action to determine how these products perform in your production system is to conduct an on-farm test.
- Testing these products on-farm helps inform if we can reliably expect to see an effect on yield in the field.

View trial reports here

MANITOBA Pulse Soybean GROWERS

Soybean Fungicide Trials

Evaluating fungicide applications on-farm

2024 Results

Trial Information:

- Three trials in 2024 compared a single application of *Delaro* to untreated soybeans.
- *Delaro* was applied at R1 stage at a rate of 230 mL/ac.
- Diseases on the label for *Delaro* include white mould, Septoria brown spot, frogeye leaf spot and stem blight.

Supporting Data:

- Rainfall at SF01 was 84% of normal in July and 93% of normal in August. At SF02, rainfall was more variable, swinging from quite wet in June to dry in July (June: 160%, July: 32%). At SF03, both July and August were dryer than normal (July: 36%, August: 70%), reducing disease pressure.
- Diseases were rated 14 days after application. Disease pressure was generally similar between soybeans that received a fungicide application and those that did not (see tables below).

Yield and Economic Results:

- There were no yield responses to a single application of foliar fungicide applied at flowering in soybeans in 2024. As a result, there was a loss in profit equivalent to the product cost ($15–20/ac).
- It is infrequent in Manitoba for Septoria brown spot, frogeye leaf spot, pod and stem blight to occur at severity levels great enough to influence soybean yield.

2024SF01

		----- Septoria Brown Spot ------		---------- Incidence (% of plants infected) ------			
	Row Spacing	Incidence (%)	Severity (0–5)	Frog Eye Leaf Spot	Northern Stem Canker	White Mould	Yield (bu/ac)
Untreated	30″	85	1.0	0	0	0	53.0
Single App.	30″	95	1.1	0	0	0	56.1
						p-value	*0.169*
						CV (%)	*4.1*
						Significant?	*No*

2024SF02

		----- Septoria Brown Spot ------		---------- Incidence (% of plants infected) ------			
	Row Spacing	Incidence (%)	Severity (0–5)	Frog Eye Leaf Spot	Northern Stem Canker	White Mould	Yield (bu/ac)
Untreated	12″	47	0.5	5	13	0	38.9
Single App.	12″	58	0.6	5	8	0	37.1
						p-value	*0.329*
						CV (%)	*7.6*
						Significant?	*No*

2024SF03

		----- Septoria Brown Spot ------		---------- Incidence (% of plants infected) ------			
	Row Spacing	Incidence (%)	Severity (0–5)	Frog Eye Leaf Spot	Northern Stem Canker	White Mould	Yield (bu/ac)
Untreated	22″	92	1.2	10	0	0	50.3
Single App.	22″	98	1.3	10	0	0	50.4
						p-value	*0.961*
						CV (%)	*3.4*
						Significant?	*No*

Soybean Fungicide Trials

Evaluating fungicide applications on-farm

Long-term Results (2014 – 2024)

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

- 71 trials from 2014 to 2024 compared a single application of foliar fungicide vs. none in soybeans.
- Fungicide product was chosen by the farmer and fungicides were applied according to the label.
  - Products were most frequently applied at R2 (full flower).
  - Products included *Acapela* (24% of trials), *Cotegra* (18%), *Delaro* (25%), *Dyax* (6%), *Priaxor* (24%) and *Veltyma* (3%).

Supporting Data:

- July rainfall was equal to or greater than normal at 23
- trials (32% of trials).
  Incidence (% of plants infected) and severity (0–5 scale) of fungal diseases are rated 10–14 days after fungicide application.
- Diseases evaluated include white mould, Septoria brown spot, frogeye leaf spot, downy mildew, northern stem canker, anthracnose. The presence of bacterial blight and Phytophthora root rot are additionally noted.
  - Of the diseases managed by fungicides, white mould has the greatest potential to limit yield in Manitoba.
- White mould was present at 14 trials (20%). White mould incidence was reduced with a fungicide application at 6 of those trials.

Yield Results:

- Overall, only 6 out of 71 trials (8%) have resulted in increased profits where the yield increase was large enough to pay for the fungicide application.
- A single foliar fungicide application has improved soybean yield 15% of the time, improving yield by 1.3 bu/ac, on average, when significant.
- Larger yield responses (>2 bu/ac) were due to a reduction in the percent of plants infected with white mould.

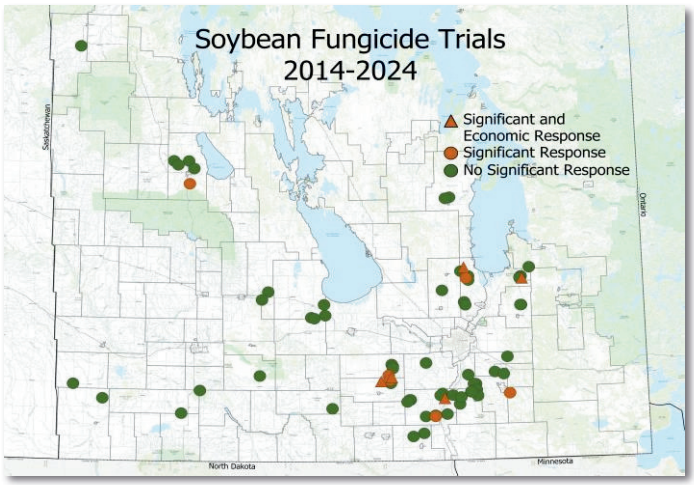


Figure 1. A bleached stem with hard black sclerotia produced by white mould.

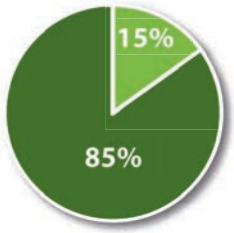


Figure 2. A single application of foliar fungicide improved soybean yield only 15% of the time from 2014 - 2024.

Recommendations from this Research:

- White mould has the potential to limit soybean yields when conditions are optimal for disease development of warm, humid conditions during flowering. Fungicides can provide a return on investment in those scenarios.
- Assess risk of white mould development at flowering to inform fungicide decisions, consider:
  - weather conditions (15-25°C and 1-2 inches of rain within 1-2 weeks of flowering),
  - canopy thickness (greater plant stands on narrow rows), and
  - crop rotation with other susceptible hosts (canola, beans, sunflowers) and if the previous broadleaf crop had a severe white mould infection.

View trial reports here

MANITOBA Pulse Soybean GROWERS

Soybean Iron Chelate Trials

Managing iron deficiency chlorosis on-farm

2024 Results

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

- One trial in 2024 compared a single application of iron chelate product (*Soygreen*) to untreated soybeans.
- Granular *Soygreen* (2.4% iron) was applied in-furrow with the seed at a rate of 4 lbs/ac.
    - *Soygreen* is chelated (ortho-ortho EDDHA) to keep iron soluble to minimize the effects of iron deficiency chlorosis (IDC) in soybeans.
- The variety seeded was Stanley (IDC rating 2.1, Semi-Tolerant) on a high IDC risk field (based on soil tests) with a history of IDC.
- Iron is less soluble in high pH, high carbonate soils. Other factors that influence iron availability include salinity, high residual nitrogen and cold, wet soil conditions.

Supporting Data:

- Heavy rainfall in May (195% of normal) and June (112% of normal) likely increased the severity of IDC and reduced the efficacy of *Soygreen*.
- Ratings for visual IDC symptoms occurred at V2 to R3 using a 1–5 scale (1 = green leaves, 3 = yellow leaves and 5 = plants are dying).
    - There were no visual differences between treatments at any stage. There were, however, large patches of visual IDC symptoms across the trial, but the patches related to soil type rather than to treatment.
- Multispectral drone imagery (Figure 1) was captured at IDC rating timings and various vegetation indices were calculated to attempt to correlate ground ratings with drone-based imagery.

Yield and Economic Results:

- There was no yield response to a single application of *Soygreen* applied at seeding in soybeans in 2024. As a result, there was a loss in profit equivalent to the product cost ($28.35/ac).

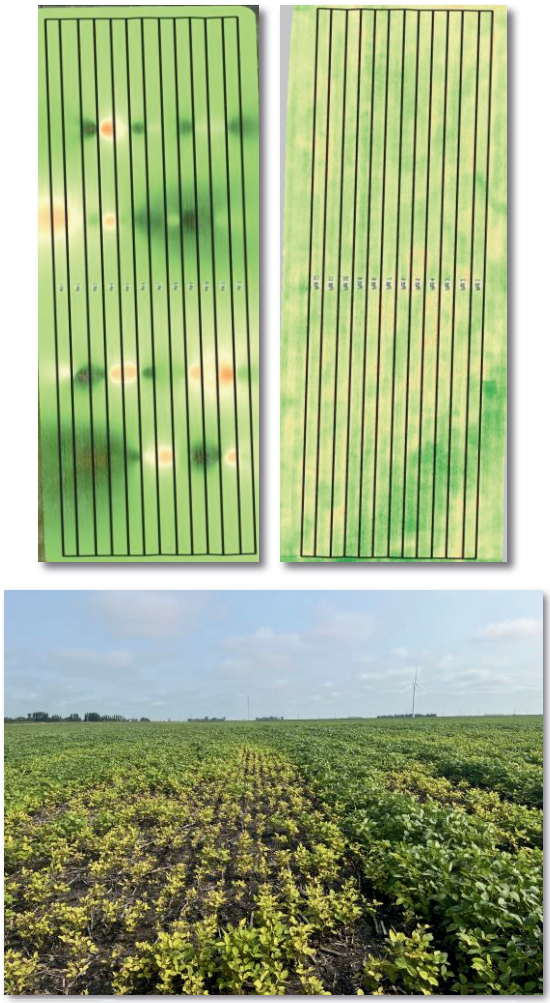


Figure 1. Mapped visual IDC ratings (top left) and NDVI imagery (top right). Severe IDC symptoms beside green plants in less affected wheel tracks (bottom).

2024SFe01

					Soil Test			
R.M.	*Soygreen* Rate	App Method	Row Spacing	Seeding Rate (seeds/ac)	Salinity (mmho/cm)	Carbonate (CCE)	Nitrates (0–24″)	IDC Risk
Montcalm	4 lbs/ac	In-furrow	7.5″	170,000	0.87	5.6%	84 ppm	Very High

	IDC Rating (1-5 scale)					
In-furrow *Soygreen*	V2	R1	R2	R3	Rating difference?	Yield (bu/ac)
Untreated	1.9	2.2	2.1	1.5	No	53.0
Treated	1.9	2.3	2.3	1.4	No	55.4
					p-value	*0.063*
					CV (%)	*3.3*
					Significant?	*No*

MANITOBA Pulse Soybean GROWERS

Soybean Iron Chelate Trials

Managing iron deficiency chlorosis on-farm

Long-term Results (2016 – 2024)

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

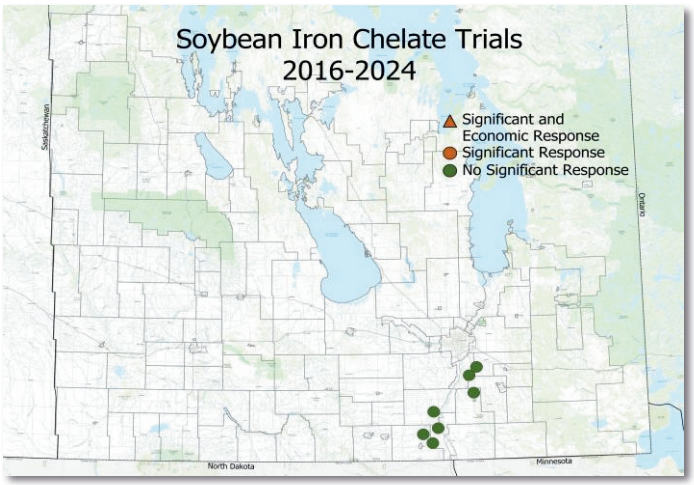
- Six trials from 2016 to 2017 and one in 2024 compared an iron chelate product (*Soygreen*) vs. untreated on-farm in soybeans.
- Iron chelate products aim to minimize the effects of iron deficiency chlorosis (IDC) in soybeans.
  - Products included a liquid in-furrow *Soygreen* (6% iron at rates of 2.5 l/ac and 3.75 l/ac) at six trials from 2016–2017, and a granular in-furrow *Soygreen* (2.4% iron at a rate of 4 lbs/ac) in 2024.

Supporting Data:

- The seven sites ranked moderate to high risk of
- developing IDC symptoms based on soil tests.
  Six different soybean varieties were seeded ranging from an IDC rating (1–5 scale) of 1.6 (tolerant) to 2.1 (semi-tolerant).
- Ratings for visual IDC symptoms occurred at V2 to R3.
  - Visual IDC symptoms were observed at five out of seven trials (71%) and visual IDC differences between treatments occurred at four out of seven trials (57%).

Yield Results:

- Yield has not been increased with the iron chelate products we have tested on-farm to date.
- *Soygreen* costs $28.32/ac for granular in-furrow resulting in a loss in profit equal to the cost of the product.



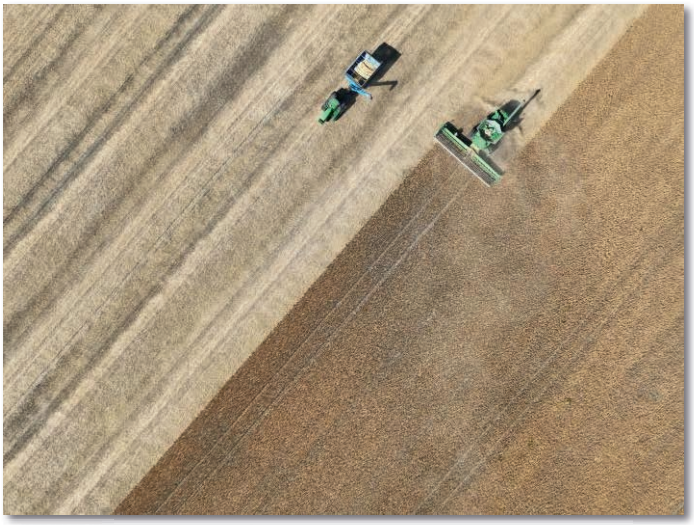


Figure 1. Aerial photo of the 2024 iron chelate trial at harvest.

Soygreen Form	*Number of Trials*	*Yield Response?*
Liquid in-furrow	6	No
Granular in-furrow	1	No

Recommendations from this Research:

- The severity of IDC in any given year is dependent on multiple factors such as seeded variety, soil type and weather.
- Choosing varieties that are rated IDC tolerant remains the best defense and there can be a significant difference
- between an IDC score of 1.7 and 2 (Consult the *2025 Soybean Variety Guide* for more information).
  On-farm testing of iron chelate products on fields with a history of IDC helps inform management decisions.

View trial reports here

MANITOBA Pulse Soybean GROWERS

Pea Seeding Rate Trials

Evaluating different pea seeding rates on-farm

2024 Results

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

- Seven pea seeding rate trials were established and five were harvested in 2024.
- The treatments compared were low, normal and high (L/N/H) seeding rates.
- Seeding rates differed between treatments by 18–39 lbs/ac and seeding rates tested ranged from 141–216 lbs/ac.

Supporting Data:

- Plant counts were recorded during V-stages and revisited during R-stages to capture how many plants established from the seeding rate and how many survived to harvest.
- Due to severe lodging, the late season plant counts were only performed at PSR01 & PSR06. At both trials, the low seeding rates resulted in a greater proportion of plants surviving to reproductive stages compared to the high seeding rates.

Yield and Economic Results:

- There were no significant yield differences among pea seeding rates tested in 2024 (Figure 1).
- Since there were no yield increases to cover the increased seed cost, there was a loss of profit with increased seeding rates at all trials.
- Assuming a seed cost of $29.33/bu *(2024 Cost of Crop Production, Manitoba Agriculture)*, there was a loss in profit of $14.67/ac up to $36.66/ac.

			Seeding Rates Tested (lbs/ac)			Plant stand at V stages (plants/ft²)			% of seeding rate established			------- Statistics -------	
Trial ID	R.M.	Germ. (%)	Low	Normal	High	Low	Normal	High	Low	Normal	High	Yield Difference?	p-value
PSR01	Grey	78	162	192	216	5.3	7	7.5	72	80	76	No	*0.627*
PSR02	Roblin	95	141	180	216	4.6	6.1	7	75	78	74	No	*0.492*
PSR04	Wallace-Woodworth	83	150	180	210	5.4	6.7	6.9	83	85	75	No	*0.184*
PSR05	Oakland-Wawanesa	-	162	180	198	6.9	7.1	8.5	97	90	99	No	*0.180*
PSR06	Rockwood	91	144	180	216	4.8	5.3	6.6	76	68	70	No	*0.071*

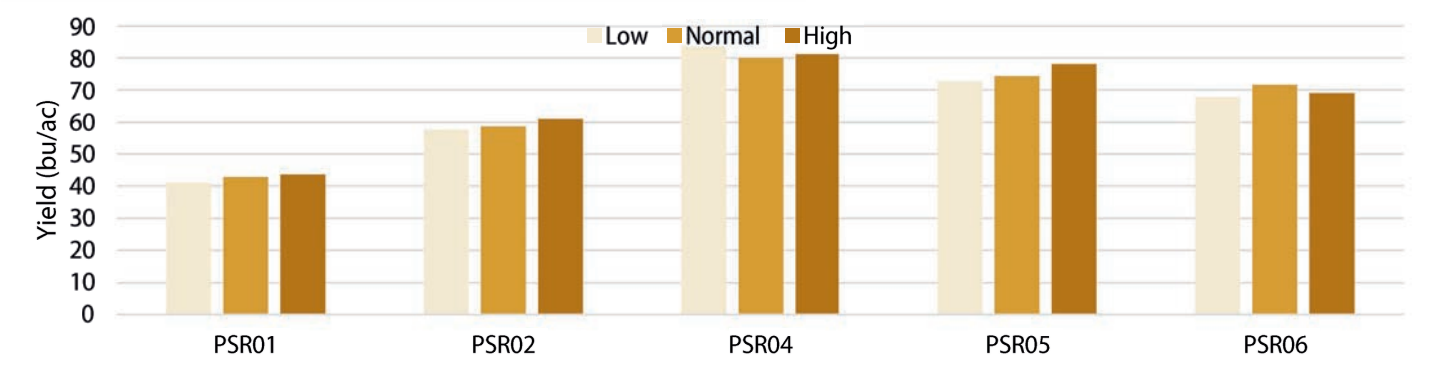


Figure 1. Yields (bu/ac) of 2024 pea seeding rate trials testing a low, normal and high seeding rate.

Pea Seeding Rate Trials

Evaluating different pea seeding rates on-farm

Long-term Results (2021 – 2024)

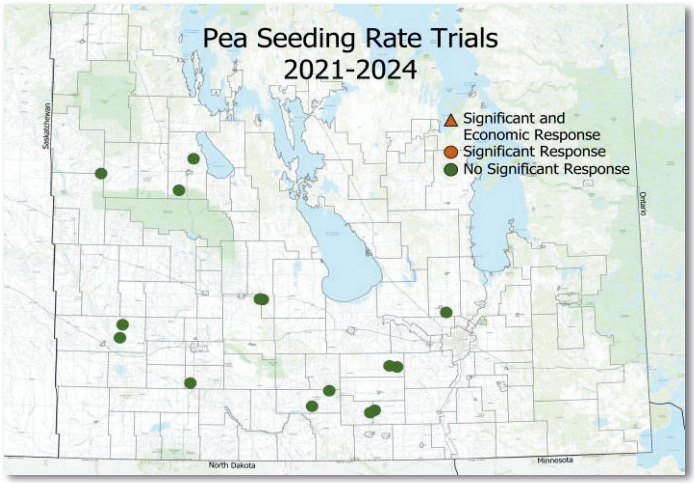
on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

- 14 pea seeding rate trials from 2021 to 2024.
- Recommended pea plant stands are 7-8 living plants/ft^2.
- A wide range in living plant stands had previously been noted in other on-farm pea trials (2.7–7.3 plants/ft^2) with seemingly little relationship to yield (Figure 1).
- Seeding rates tested are determined by each farmer with an average treatment difference of 35 lbs/ac (0.58 bu/ac).
- All other crop management activities are the same (row spacing, weed control, fertility, etc.).

Supporting Data:

- Plant counts are recorded during V-stages and R-stages.
- Early-season establishment has been 72% on average.
- On average, 5% of pea plants have died during the growing season between early-season and late-season plant counts.
- When comparing among seeding rates, lower seeding rates typically have better percent establishment (on avg 6% ↑) and a greater proportion of plants surviving to R-stages than medium or high seeding rates tested.



Yield and Economic Results:

- To-date, there have been no significant yield responses to different pea seeding rates tested on-farm.
- A difference of 20 seeds/m^2 is roughly 40 lbs/ac, depending on variety TKW, and this would result in a profit loss of $19.55 with each seeding rate increase of 40 lbs/ac.

Recommendations from this Research:

- Pea seed survivability has been lower than expected on-farm, with only 72% of the seed put in the ground establishing a living plant on average.
- While no yield responses have occurred, dropping seeding rates too low can have negative impacts on standability and crop competition with weeds.
- Evaluate living plant stands in your pea fields and relate those plant counts back to your seeding rate. Are there areas where you can improve survivability on your farm?

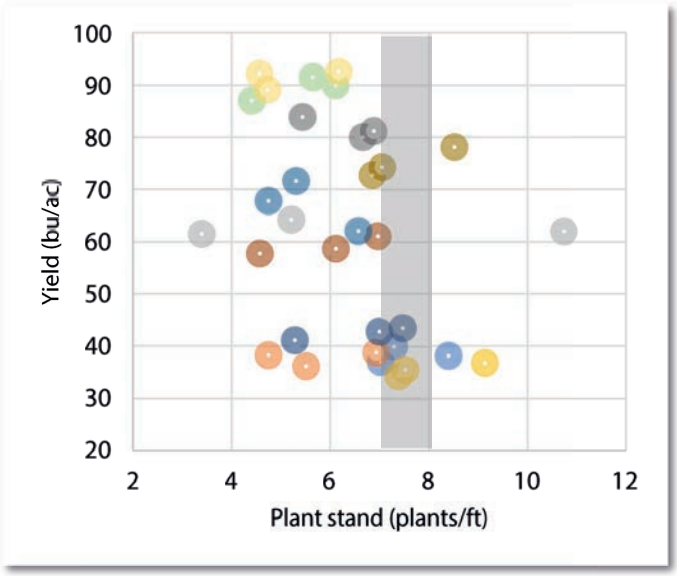


Figure 1. Average pea yields for each seeding rate treatment tested at on-farm trials from 2021 to 2024, reported by the established living plant stand at V stages (plants/ft^2). Data points are colour-coded by trial. The shaded area indicates the recommended plant stand of 7–8 plants/ft^2.

View trial reports here

MANITOBA Pulse Soybean GROWERS

Pea Seed Treatment Trials

Comparing treated vs. untreated seed on-farm

2024 Results

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

- Three trials in 2024 investigated pea seed treatments.
  - Two trials (PST01 and PST02) investigated a fungicide seed treatments vs. untreated seed
  - One trial (PST03) investigated an insecticide plus a fungicide seed treatments vs. untreated seed.

Supporting Data:

- PST01 and PST02 were soil sampled in the spring and tested for Aphanomyces root rot. Aphanomyces was not detected at PST01 and a high level of Aphanomyces was detected at PST02.
- At V6, 10 plants were rated for root rot. Root rot incidence (% of plants infected) and severity were reduced with a seed fungicide treatment at two out of three trials.
- At all three sites, severity of root rot remained low (<1 on a 0–9 scale).
- Pea leaf weevil defoliation was assessed at PST03 since an insecticide seed treatment was tested. There were no differences in total number of notches per plant at V6.

Pea root rot severity ratings. L to R: 0 = healthy roots, 1 = infection at the point of seed attachment and 2 = lesion covering 5-10% of roots.

Yield and Economic Results:

- There were no significant yield differences among pea seed treatments or untreated peas in 2024.
- Since there were no yield increases to cover the extra seed treatment cost, there was a loss in profit of $16–19/ac for *Rancona Trio* and $33/ac for *Vibrance Maxx + Cruiser 5FS*.

2024PST01

Seed Treatment	Germ.	Plant Stand (plants/ft²)	Root Rot: Incidence (% of plants infected)	Root Rot: Severity (0–9 scale)	Yield (bu/ac)
Rancona Trio	84%	4.7	38%	0.4	68.1 A
Untreated	85%	6.0	50%	0.6	71.9 A
				p-value	*0.410*
				CV	*8%*
				Difference?	No

2024PST02

Seed Treatment	Germ.	Plant Stand (plants/ft²)	Root Rot: Incidence (% of plants infected)	Root Rot: Severity (0–9 scale)	Yield (bu/ac)
Rancona Trio	90%	6.4	30%	0.3	56.6 A
Untreated	-	4.6	10%	0.1	57.5 A
				p-value	*0.709*
				CV	6%
				Difference?	No

2024PST03

Seed Treatment	Germ.	Plant Stand (plants/ft²)	Root Rot: Incidence (% of plants infected)	Root Rot: Severity (0–9 scale)	Pea Leaf Weevil: Total # Notches per plant at V6	Yield (bu/ac)
Vibrance Maxx + Cruiser 5FS	97%	4.6	53%	0.6	53	47 A
Untreated	97%	5.1	63%	0.7	51	47.5 A
				p-value	*0.729*	*.691*
				CV	*12%*	*3%*
				Difference?	*No*	*No*

Pea Seed Treatment Trials

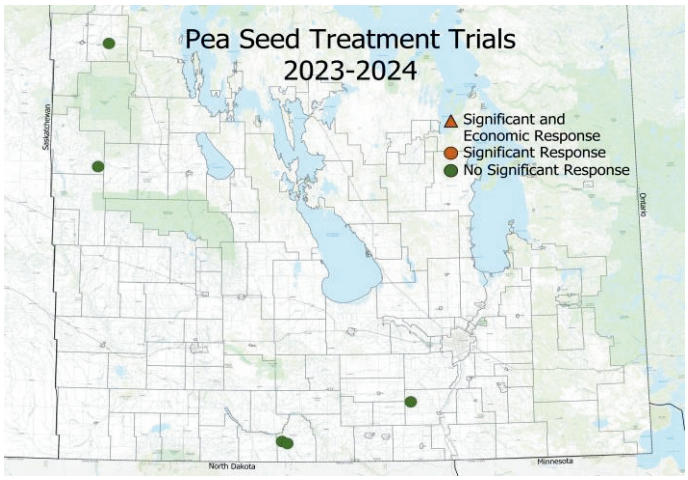
Comparing treated vs. untreated seed on-farm

Long Term Results (2023 – 2024)

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

- Five on-farm trials compared pea seed treatments vs. untreated peas from 2023 to 2024.
- Of those trials, three used a fungicidal seed treatment only and two used fungicide plus an insecticide.



Supporting Data:

- On average, 5% fewer plants were infected with root rot when comparing treated to untreated peas.
- Across all trials and treatments, root rot severity between treatments has been similar (0.5 untreated vs. 0.4 treated) and has remained very low (<1 on a 0-9 scale).
- Insecticide seed treatments tested so far in these trials offer protection from pea leaf weevils and wireworms.
    - There have been no differences in total number of pea leaf weevil notches per plant to insecticide seed treatment vs no insecticide seed treatment. Wireworms have not been observed at either trial.

Yield and Economic Results:

- To date, there have been no significant yield differences among pea seed treatments or untreated peas (Figure 1).
- Since there were no yield increases to cover the extra seed treatment cost, there was a loss in profit of $17.5/ac for fungicide seed treatments and $12.5/ac for insecticide seed treatments.

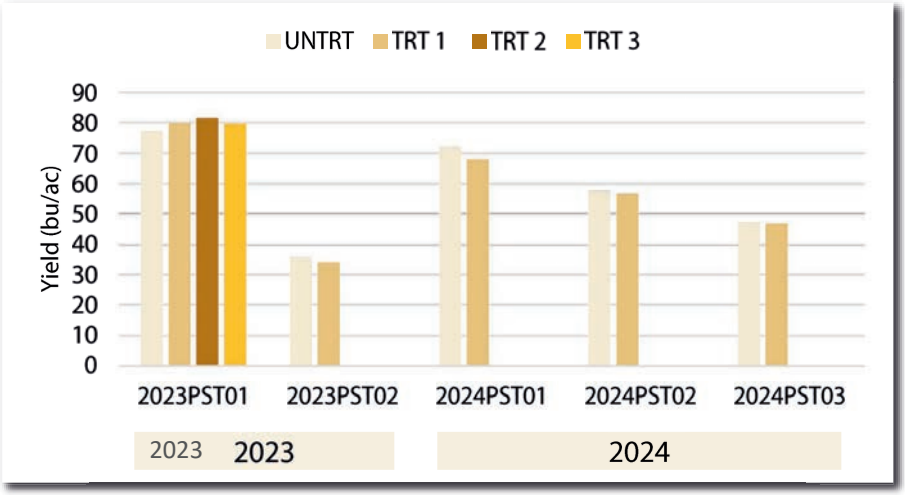


Figure 1. Average pea yields for each treatment tested at on-farm trials from 2023-2024. TRT1 in 2023PST01 & 2024PST03 was a fungicide plus an insecticide. TRT1 in the other three trials was a fungicide component only.

Recommendations from this Research:

- Fungicide seed treatments offer early-season protection lasting roughly three weeks after planting.
- Seed treatments offer control over seedling root rot pathogens, including Fusarium, Pythium and Rhizoctonia and
- some seed treatments additionally offer suppression of Aphanomyces.

An integrated disease management approach is recommended to mitigate the effect of root rots in peas:

- A minimum of four years between pea crops. If Aphanomyces is present in the field, extend this to 6-8 years.
- Seed peas into well drained fields with light textures soils.
- Seed peas early to maximize yield and reduce root rot severity
- In fields with root rot history, seed treatments have shown to improve yields in North Dakota.
- Scout peas in June and July to evaluate root rot severity and distribution and soil test for Aphanomyces.

View trial reports here

MANITOBA Pulse Soybean GROWERS

Pea Fungicide Trials

Evaluating fungicide applications on-farm

2024 Results

Trial Information:

- Six trials compared a single application of fungicide applied at flowering vs. none in 2024 (PF02, PF03, PF04, PF05, PF06 and PF07).
- Three trials compared two applications of fungicide vs. one application (PF01, PF08 and PF09).

Supporting Data:

- This season there was more rainfall than normal across the province in May and June carrying high humidity within the crop canopy allowing disease to flourish before and during flowering.
- Foliar and stem infections of Aschochyta/Mycosphaerella (A/M) blight and other fungal diseases were rated 10–14 days after application.
  - The percent of plants with foliar A/M lesions were similar between sprayed and untreated peas. The severity of those infections, however, was reduced with a fungicide application at 7 out of 9 trials (Figure 1).
  - The percent of plants with stem infections of A/M was reduced with a fungicide application at 5 out of 9 trials. The severity of those infections, however, was reduced with a fungicide application at 4 out of 9 trials.
- After harvest, seed samples were submitted for further disease testing to assess if fungicide had any impact on the percentage of seed infected with Ascochyta. A fungicide application reduced the amount of seed infections at 3 out of 8 trials in 2024.

Yield and Economic Results:

- There were no yield differences at the 6 single application vs. none trials.
- There were no yield differences at the 3 double vs. single application trials.
- Assuming a product cost ranging $15–20/ac and a pea sell price of $9.60/bu, a break-even yield increase would be 1.6–2.1 bu/ac.

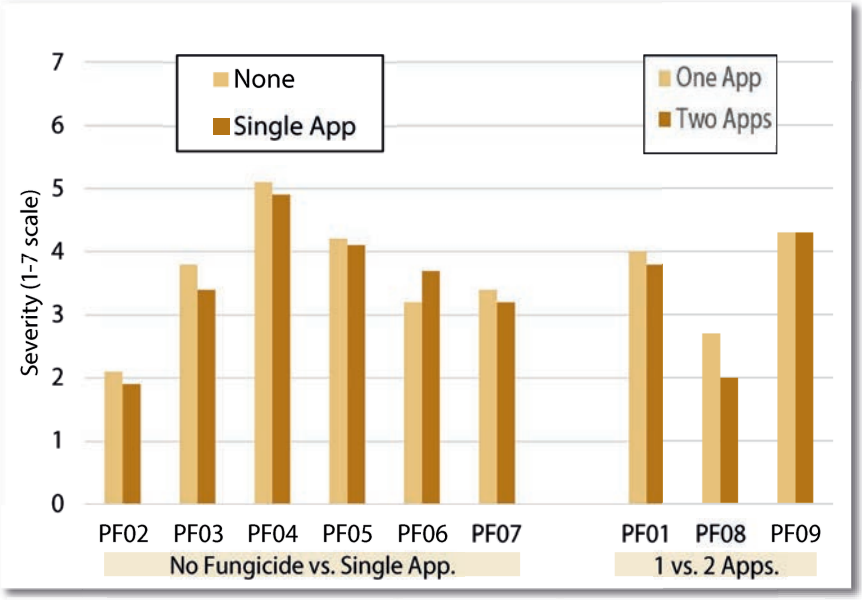


Figure 1. Severity of foliar Ascochyta/Mycosphaerella blight infections rated on a scale from 1 to 7.

Trial ID	Nearest Town	--Seed-Borne Ascochyta[1]-- No App	Product 1	Product 2
PF02	Pipestone	0	0	-
PF03	Virden	0.5%	0	-
PF04	Marquette	4.5%	1.5%	-
PF05	Sperling	0	0	-
PF06	Roblin	0	0	-
PF07	Brandon	0.5%	0	-
PF01	Cartwright	-	0	0
PF08	Dauphin	-	0	0

[1]Post-harvest assessment of the effect of an in-season fungicide application on percent of seed infected with Ascochyta

Pea Fungicide Trials

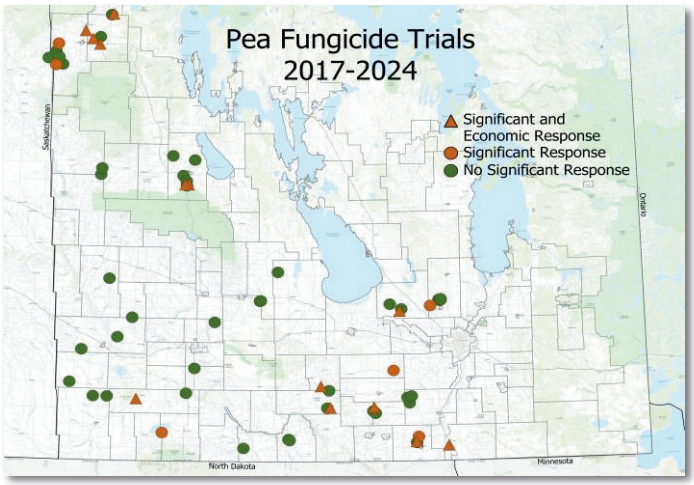
Evaluating fungicide applications on-farm

Long-term Results (2017 – 2024)

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

- 62 on-farm trials have explored fungicide applications in peas from 2017 to 2024.
  - 38 trials have compared a single application vs. none (1 vs. 0).
  - 21 trials have compared two applications vs. a single application (2 vs. 1).
- Products are chosen by participating farmers and applied according to label recommendations.
  - 1st apps are typically applied at R1–R2 (early to full flower) and 2nd apps 10–14 days later at R3 (flat pod).



Supporting Data:

- Diseases have been evaluated since 2019. Ascochyta/ Mycosphaerella (A/M) blight is the main disease target of fungicide application and both foliar and stem infections are rated.
- None vs. single (0 vs. 1 application):
  - The percent of plants with foliar A/M infections has been similar between treated and untreated peas. The severity of those foliar infections has been reduced with a fungicide application at 56% of trials. Stem infections have been reduced in incidence and severity at 41% of trials.
- Single vs. Double (1 application vs. 2):
  - The percent of plants with foliar infections has been similar between one application and two. The severity of foliar infections was reduced at 62% of trials. Stem infections occurred less with a second app at 54% of trials and severity of stem infections was reduced at 46% of trials.

Yield Results:

- Single vs. None (1 app. vs. 0):
  - A single application of fungicide improved pea yield 26% of the time vs. no app, increasing yield by 5.8 bu/ac on average (range: 1.4–13.8 (bu/ac).
  - During dry years (2019–21), it was more common for a farmer to question if a fungicide application was necessary at all due to low disease risk. In these years, fungicide application paid less frequently.
- Double vs. Single (2 vs. 1 app.):
  - Two applications improved pea yield 33% of the time vs. one app, increasing yield by 5.1 bu/ac on average (range: 2.7–7.1 bu/ac).
  - In wetter growing conditions that were conducive to disease development, it was more common to question if a second fungicide application was necessary to manage disease. When a second application has protected yield, it has consistently provided a return on investment in on-farm trials (all yield responses were economical).

Recommendations from this Research:

- Make informed fungicide application decisions by scouting peas ahead of application from V10 to R2, around late June to mid July. Look in the bottom of the crop canopy for freckling symptoms on lower leaves .
- Use *MPSG's Fungicide Decision Worksheet* to assess risk factors like crop canopy thickness, humidity, weather conditions and the percentage of plants showing symptoms.
- Revisit pea fields following application to assess if a second application may be warranted.

View trial reports here

Pea Double Inoculant Trials

Comparing double vs. single inoculation strategies

2024 Results

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

- One trial in 2024 compared a double (liquid on-seed + granular in-furrow) vs. single inoculant (liquid on-seed) strategy.

Supporting Data:

- Nodules are rated at the flower bud (R1) stage by counting the number of pink, active nodules per plant using a 0-5 scale:
  - 0 = no nodules OR nodules white or green in colour
  - 1 = <3 clusters of nodules
  - 3 = 3-5 clusters of nodules
  - 5 = >5 clusters of nodules
- There were no differences in nodulation between inoculation strategies in 2024 (Figure 2).

Yield and Economic Results:

- There were no significant yield differences between double (2x) and single (1x) inoculation strategies on-farm in 2024 (Figure 3).
- Assuming a cost of $10/ac for the additional granular inoculant, there was a loss in profit of $10/ac with a double inoculation strategy.

Figure 1. At the time of the assessment, the pea roots in this trial were nodulating adequately for both treatments.

		History		Average Nodulation Rating			Statistics			
Trial ID	R.M.	# previous pea crops	years since last pea crop	1x	2x	Nodulation Difference	p-value	Yield Difference?	p-value	CV (%)
P2IN01	Wallace-Woodworth	1	15	4.1	4.0	0.1	*0.408*	No	*0.902*	*2.7*

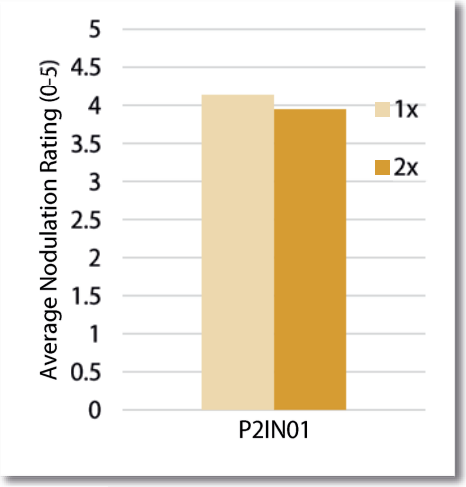


Figure 2. Average pea root nodulation of a double (2x) inoculant (liquid on-seed + granular in-furrow) vs. a single (1x) inoculant (liquid on-seed).

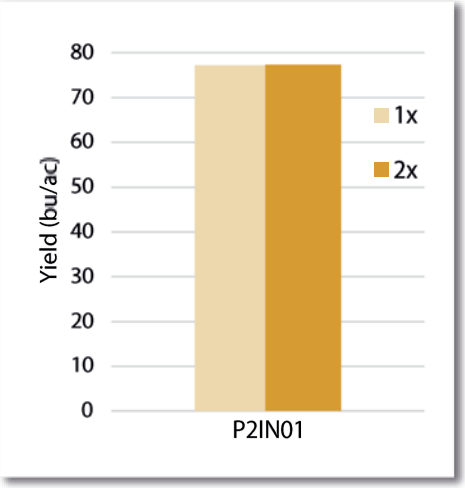


Figure 3. Pea yield (bu/ac) of a double (2x) inoculant (liquid on-seed + granular in-furrow) vs. a single (1x) inoculant (liquid on-seed).

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Pea Double Inoculant Trials

Comparing double vs. single inoculation strategies

Long-term Results (2021 - 2024)

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

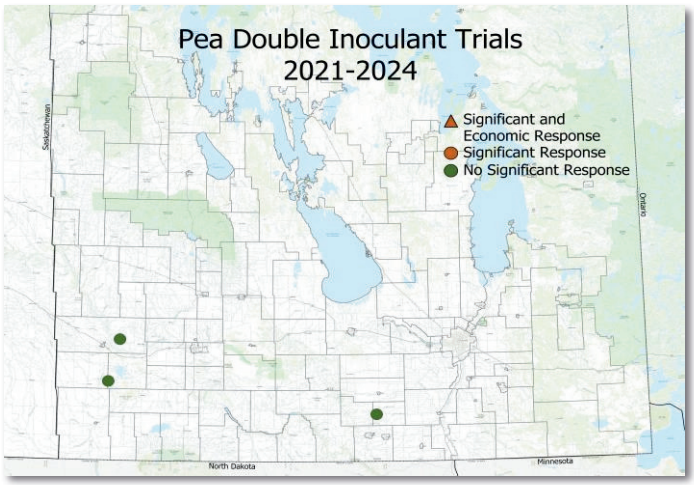
- Three trials from 2021 to 2024 compared a double (liquid on-seed + granular in-furrow) vs. single inoculant (liquid on-seed) strategy.
    - One of those trials (2022PI2IN01) was a pea and canola intercrop.

Supporting Data:

- Nodules are rated at the flower bud (R1) by counting the number of pink, active nodules per plant using a 0–5 scale:
    - 0 = no nodules OR nodules white or green in
    - colour
    - 1 = <3 clusters of nodules
    - 3 = 3-5 clusters of nodules
      5 = >5 clusters of nodules
- There were no differences in nodulation between inoculation strategies from 2021 to 2024.

Yield and Economic Results:

- There were no significant yield differences between double (2x) and single (1x) inoculation strategies on-farm from 2021 to 2024 (Figure 1).
- Assuming a cost of $10/ac for the additional granular inoculant, there was a loss in profit of $10/ac with a double inoculation strategy.



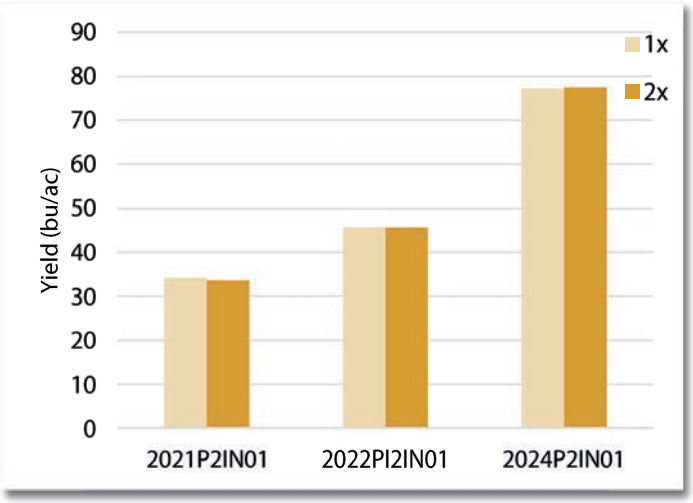


Figure 1. Yields (bu/ac) of three on-farm trials from 2021 to 2024 comparing a double (2x) vs. single (1x) inoculant strategy.

Figure 2. Healthy root nodules.

Recommendations from this Research:

- Inoculating field peas with the correct strain of rhizobium (*Rhizobium leguminosarum*) has the potential to fix up to
- 55% of their nitrogen requirement, on average.
- Inoculate peas even on fields with a history of peas, to facilitate root nodule development and biological N fixation.
- Evaluate nodulation and plant growth and vigour at flowering each year to determine if adequate N fixation is occurring.
  Under challenging conditions, research has shown an advantage to granular inoculant, followed by peat inoculant over liquid inoculant. Granular and peat formulations provide some resiliency against environmental stress (e.g., dry conditions).
- While yield responses have not occurred to date, consider double inoculating fields with no history of peas.

View trial reports here

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Dry Bean Fungicide Trials

Evaluating fungicide applications on-farm

2024 Results

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

- Three trials compared a single application of foliar fungicide applied at flowering vs. none in dry beans (DBF01, DBF02 and DBF04).
- One trial compared two applications of fungicide vs. one application (DBF03).

Supporting Data:

- Rainfall plays a large role in white mould development. While July rainfall was generally lower than normal, rainfall in May and June was substantially higher than normal carrying more than enough humidity for disease development into flowering.
- Diseases were rated 10–14 days after each application and revisited 30 days after application for a second disease assessment.
- At the first rating, white mould was present at two trials (DBF02 and DBF03), however, severity remained low (0.1–0.8 (0–5 scale)).
- At the second assessment, the percentage of plants with white mould symptoms generally increased at 3 out of 4 trials while severity remained low.
- Bacterial blight was present at all trials, ranging from 48%–100% of plants infected. As bacterial blight is not controlled by fungicide applications, disease severity was not evaluated.

Figure 1. White mould (pictured above) early symptoms (L) and late symptoms (R). Plants are rated from 0 (no apparent symptoms) to 5 (extensive mycelial growth).

Yield and Economic Results:

- There were no yield responses to fungicide applications so a loss in profit of roughly $20–25/ac occurred.

				White mould (% of plants infected)		------ Yield (lbs/ac) ------		--------- Statistics --------	
Trial ID	Trial Type	R.M.	Product(s)	Untreated	Single App.	Untreated	Single App.	p-value	Significant?
DBF01	1 vs. 0	Rhineland	Zolera FX	0%	0%	2563	2509	*0.607*	No
DBF02	1 vs. 0	Glenboro	Zolera FX	43%	38%	2064	2086	*0.732*	No
DBF04	1 vs. 0	North Norfolk	Dyax	0%	0%	2975	3049	*0.334*	No
				Single App.	Two Apps.	Single App.	Two Apps.		
DBF03	2 vs. 1	Lorne	Proline Gold + Revy Pro	0%	5%	2812	2929	*0.346*	No

Dry Bean Fungicide Trials

Evaluating fungicide applications on-farm

Long-term Results (2016 – 2024)

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

Trial Information:

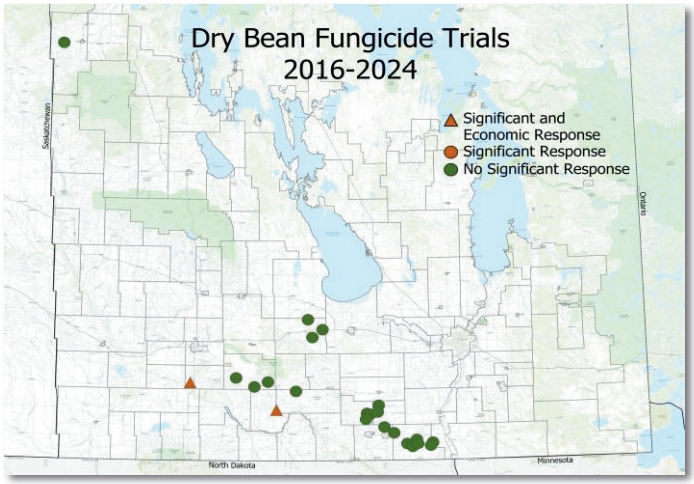
- 23 trials from 2016 to 2024 have compared a single application of foliar fungicide vs. none in dry beans.
  - Two trials compared two applications to one.
- Fungicide product was chosen by the farmer, and fungicides were applied according to the label .
  - Products were most frequently applied at R2 (early pin bean).
  - Products included *Acapela, Lance, Cotegra, Allegro, Proline Gold, Dyax and Zolera FX.*
- 20 trials were grown on 30" rows and 3 trials were on 15"or narrower rows.

Supporting Data:

- White mould is the main disease target of fungicides applied in dry beans. July rainfall is critical for this disease's development. July rainfall was at or above normal at 4 of 21 single vs. none trials, otherwise trial fields were drier than normal.
- Diseases were rated 10–14 days after application. White mould was present at 45% of trials and the percent of plants infected were lower in those that had a fungicide app at 7 out of 8 trials where the disease was present.

Yield Results:

- A single foliar fungicide application has improved dry bean yield at 2 trials (10% of the time). Yields were improved by 165–175 lbs/ac, where significant.
- Two foliar fungicide applications have not improved yields vs. one foliar application.
- Assuming an average product cost of $22.5/ac and a dry bean sell price of $0.47/lb, a profit increase of roughly $57/ac occurred at those two significant sites.



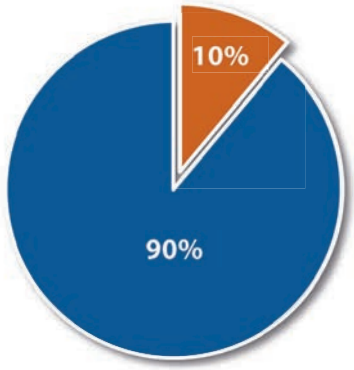


Figure 1. A single application of foliar fungicide improved dry bean yield and provided a return on investment only 10% of the time in these on-farm trials.

Recommendations from this Research:

- Fungicides for white mould are preventative, meaning they must be applied before symptoms of the disease are observed in the field.
- White mould has the potential to limit dry bean yields when conditions are optimal for disease development (warm, humid conditions around flowering) and fungicides can protect yield and provide a return on investment in those scenarios.
- Assess risk of white mould development at flowering to inform fungicide decisions, consider:
  - √ Weather conditions (15–25°C and 1–2 inches of rain within 1–2 weeks of flowering are the greatest risk),
  - √ Canopy thickness (greater plant stands on narrow rows or high N rates leading to lush, thick canopies),
  - √ Crop rotation with other susceptible hosts (canola, beans, sunflowers) and if the previous broadleaf crop had a severe white mould infection.

View trial reports here

MANITOBA Pulse Soybean GROWERS

NOTES

2024 ON-FARM RESEARCH RESULTS

MCGA

MANITOBA CANOLA GROWERS

Program Overview

Canola On-Farm Research

MCGA On-Farm Research Program aims to collaborate with farmers, agronomists and researchers across Manitoba to provide the most relevant and valuable information to our members.

Manitoba Canola Growers On-Farm Research Program began in 2022 with 3 trial type across 12 trial locations, it has since grown to include 5 trial types and 37 testing locations across Manitoba.

Manitoba Canola Growers

Trial Type	2024 Trial Locations	Testing Years
Nitrogen Rate	5	2022 – 2024
Seeding Rate	6	2022 – 2024
Phosphorus Source	4	2024
Seed Placed Fertilizer Toxicity	19*	2023 – 2024
Cover Cropping for Flea Beetle Management	3	2024

*Replicated by location (1 rep per location)

2024 Agronomic Partners:

- Antara Agronomy Service Ltd.
- Tone Ag Consulting Ltd.
- New Era Ag Research
- 360 Ag Consulting
- Double Diamond Farm Supply

Program funding provided in part by:

Sustainable Canadian Agricultural Partnership

If you are a canola farmer interested in hosting a trial or have a trial idea please contact **Amy Delaquis at (204)-384-1196 or amy@canolagrowers.com**

Summary

Canola Nitrogen Rate Trial

Research Question:

Are nitrogen (N) rates being used for canola production across Manitoba sufficient for optimizing yield and nitrogen efficiency?

Treatments:

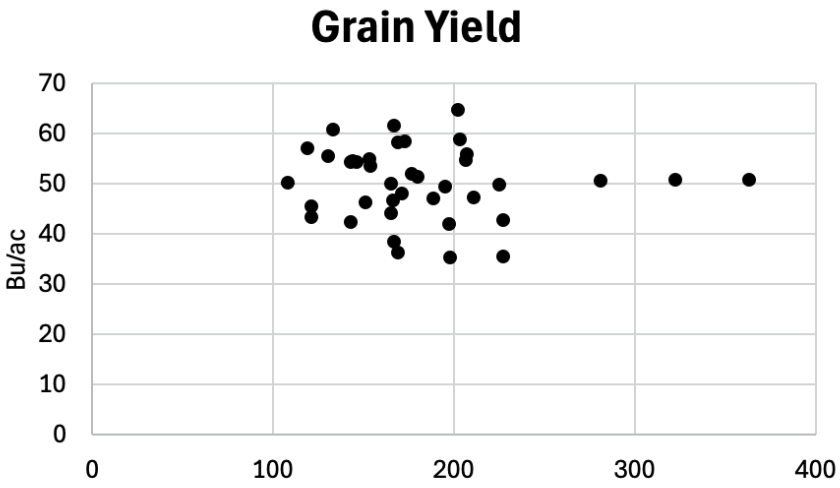
1. Reduced N Rate (75%)
2. Standard N Rate (100%) - Farm Normal for Field
3. High N Rate (125%)

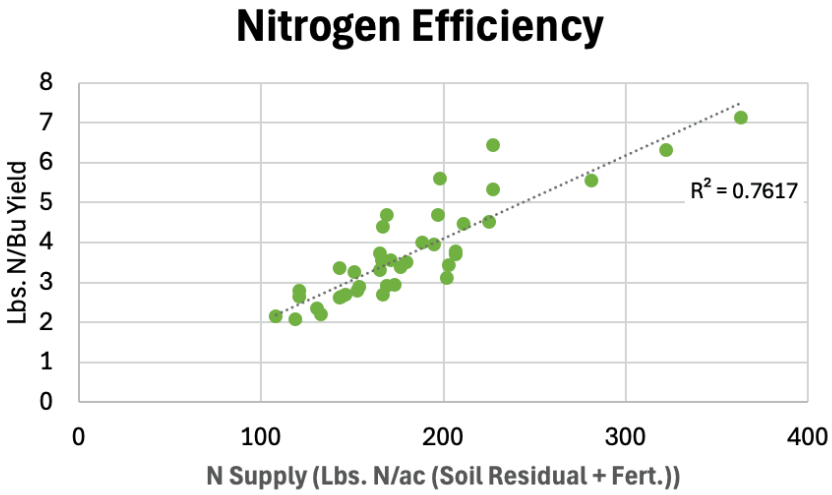
Trial Setup:

Randomized complete block, each treatment was one equipment width x field length, with 4 replicates per locations (12 strips per location)

Data Collection:

Plant Counts, Tissue N (bolting), Yield, Protein, Oil Content





Background: Current research indicates that canola uptakes an average of 2.6 lbs. of N per bushel of grain yield, with a wide range of 1.3 to 3.6 (Walley et al. 2023). The amount of N available to the crop during the growing season from fertilizer applications and soil supplies can vary widely depending on management and growing season conditions. This makes understanding crop N use on a farm level a major priority for farmers to ensure they are supplying canola with sufficient N while maximizing return on investment.

2022 - 2024 Summary: The vast majority (94%) of fields tested in this trial since 2022 were supplying sufficient N with their current practices, seeing no significant increase in grain yield with a 25% increase in N rate (95% confidence).

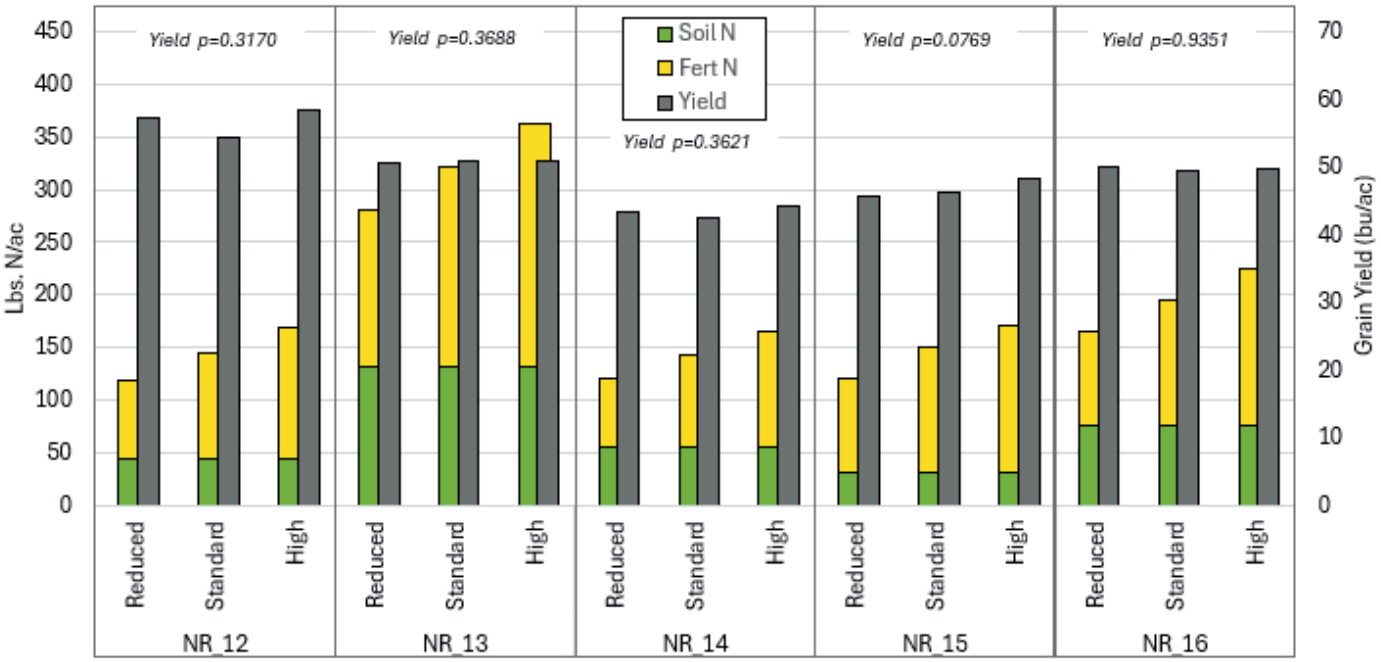
2024 Results

Canola Nitrogen Rate Trial

2024 Nitrogen Rate Trial Sites

Trial ID	RM	Residual N (0-24in)	N Rates (lbs. N/ac)			N Source
			Reduced	Standard	High	
NR_12	Rhineland	44	75	100	125	UAN
NR_13	Brokenhead	132	149	190	231	Urea
NR_14	MacDonald	56	65	87	109	UAN
NR_15	Minitonas-Bowsman	31	90	120	140	Anhydrous
NR_16	Pembina	75	90	120	150	ESN/Urea (50/50)

2024 Grain Yield and Nitrogen Supply



Grain Yield

Yield ranged from 42 to 58 bu/ac across all N rate trials in 2024. There was no significant effect of N rate at any trial location, indicating that N was not a yield limiting factor in these trials.

Nitrogen Efficiency

The average amount of N suppled per bushel of grain yield in the 2024 trials was 3.8 lbs. N/bu, ranging from 2.1 to 7.1lbs N/bu. Because grain yield was not significantly increased when N rates increased, as the amount of N fertilizer supplied to the crop increased the efficiency of N was reduced. This would have reduced economic returns as more N fertilizer was used to produce similar grain yield.

All results presented are preliminary as the trial will continue to run again in 2025 field season. Grain protein and oil content data is pending for 2024 field season.

Summary

Canola Seeding Rate Trial

Research Question:

Can Manitoba canola farms reduce their seeding rates without sacrificing yield to increase return on investment?

Treatments:

1. Reduced Seeding Rate (75%)
2. Standard Seeding Rate (100%) - *Farm Normal*
3. High Seeding Rate (125%)

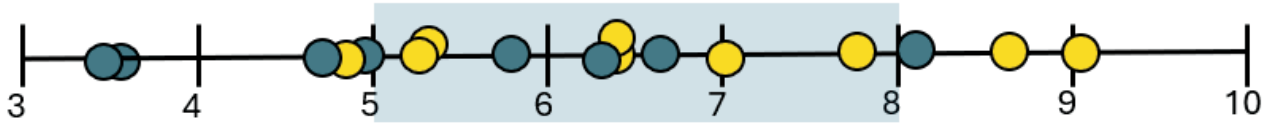
Trial Setup:

Randomized complete block, each treatment was one equipment width x field length, with 4 replicates per location (12 strips per location)

Data Collection:

Plant Counts, Emergence, Survival, Yield

Plant Establishment with Farm Standard Seeding Rate (2022-2024)



	Emergence	Seeding Rate
Air Drill	51 – 89%	3 – 5 lbs./ac
Planter	77 – 98%	2 – 3.3 lbs./ac

Background: The recommended plant stand for canola is 5-8 plants/ft2 to maximize return on seed investment while minimizing risks associated with low plant populations such as reduced competitive ability against pests. The emergence of canola seed in the field is highly variable and dependent on farm management growing season conditions. Therefore, it is important that growers understand emergence in their operations and how that may change with seeding rate decisions.

2022-2024 Summary: Overall, there was no significant influence of seeding rate on grain yield. When seeding rates were reduced by 25% emergence increased by 13% and when seeding rates were increased by 25% emergence was 4% lower than the standard seeding rates. This indicates that, on average, seeding rates can be lowered without a large reduction in plant stand to increase economic return on investment.

2024 Results

Canola Seeding Rate Trial

2024 Seeding Rate Trial Sites

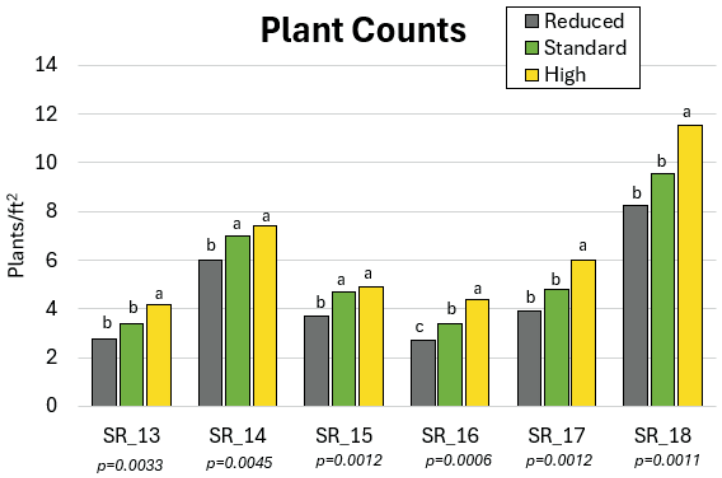
Trial ID	RM	Seeding Equipment (Row Spacing)	Seeding Rate (lbs./ac)			TKW (g)
			Reduced	Standard	High	
SR_13	Emerson – Franklin	John Deere DB88 (22 in)	1.4	2	2.7	4.7
SR_14	Lac du Bonnet	Horsch Disc Drill (10 in)	3.1	3.9	4.7	5
SR_15	Grey	John Deere 1790 (15 in)	2.4	2.8	3.4	5
SR_16	Brokenhead	Bourgault 3820 - Air Planter (10 in)	1.5	2	2.5	4.7
SR_17	Morris	Bourgault Disc Drill (10in)	2.25	3	3.75	4.9
SR_18	Swan Valley West	Bourgault 3320 XTC (10in)	3.4	4.2	5.1	4.1

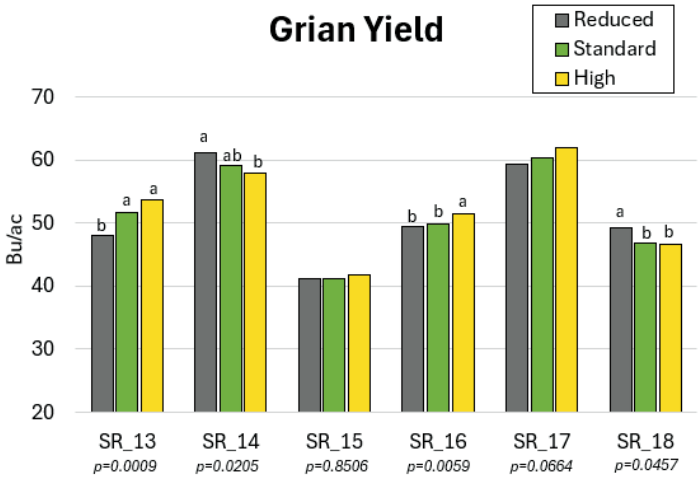
Plant Establishment:

Out of the 6 trials in 2024 there was 4 that were pushing very low seeding rates with their farm standard practices (<3 lbs./ac), leading to plant stand establishment being lower than the recommended 5 plants/ft2. All trials had increased plant stand with increasing seeding rates.

Grain Yield:

There was an increase in grain yield with the high seeding rates at the two trials that had the lowest standard seeding rates (2 lbs./ac) and plant populations (3.1 - 3.4 plants/ft2). Alternatively, the two locations that had higher plant stands with their standard seeding rates (7-9.5 plants/ft2) had an increase in grain yield when seeding rate was reduced.





Within each trial location treatments with similar lowercase letters are not significantly different at 95% confidence level. Locations with no lowercase letters listed indicate an insignificant treatment effect.

2024 Highlights:

Across the 2024 trials it was critical that that standard seeding rate was targeting a plant stand >4.5 plants/ft2 to avoid yield loss due to insufficient plant populations.
All results presented are preliminary as the trial will continue to run again in 2025 field season

NEW TRIAL TYPE

Summary

Canola Phosphorus Source

Research Question:

What is the influence of Phosphorus (P) fertilizer sources on crop P availability, seed safety and yield for canola production across Manitoba soils.

Treatments:

Each farm chose whichever P sources were of interest to them to include in the trial.

1. P Source 1 – Standard Rate
2. P Source 1 – High Rate
3. P Source 2 – Standard Rate
4. P Source 2 – High Rate

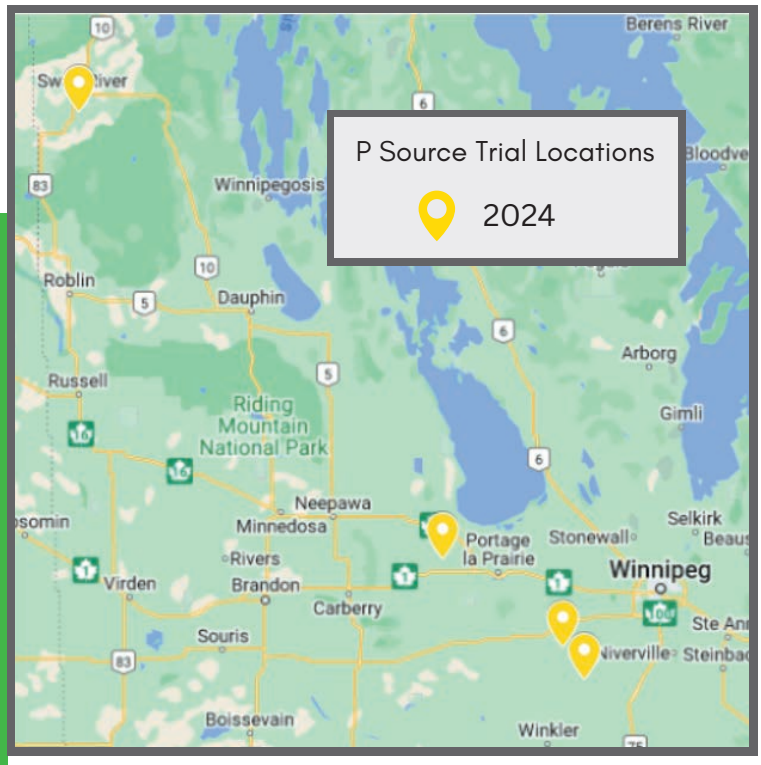
Includes one unreplicated untreated control (no P) plot to characterize P responsiveness of field.

Trial Setup:

Randomized complete block, each treatment was one equipment width x field length, with 4 replicates per locations (12 strips per location)

Data Collection:

Plant Counts, Emergence, P Tissue, Biomass (Rosette), Yield



Background: Canola requires P in large amounts during the growing season (approximately 1.5 lbs. of phosphate per bushel), especially during the early growth stages. The early season demand of P and immobility in the soil P fertilizers are typically applied in close proximity to the canola seed row, which may result in toxicity issues when large amounts of P fertilizer are applied. There are many different P fertilizers being marketed to farmers with claims of increased seed safety and P availability compared to conventional P sources with little independent research done across Manitoba growing regions.

2024 P Source Trial Sites

Trial ID	RM	Soil Residual P (0-6 in)	P Placement	Seeding Equipment	Row spacing
PS_01	North Norfolk	7 ppm	Side-Banded	John Deere 1790	15 in
PS_02	Grey	13 ppm	Seed-Placed	New Holland P250	10 in
PS_03	Swan Valley West	4 ppm	Seed-Placed	Bourgault 3320 Paralink	10 in
PS_04	Morris	8 ppm	Seed-Placed	John Deere N560F	10 in

2024 Results

Canola Phosphorus Source

NEW TRIAL TYPE

Note: Due to challenges in handling and supply of P sources not all trial locations were able to test the exact same total P205 rates for the two fertilizer sources.

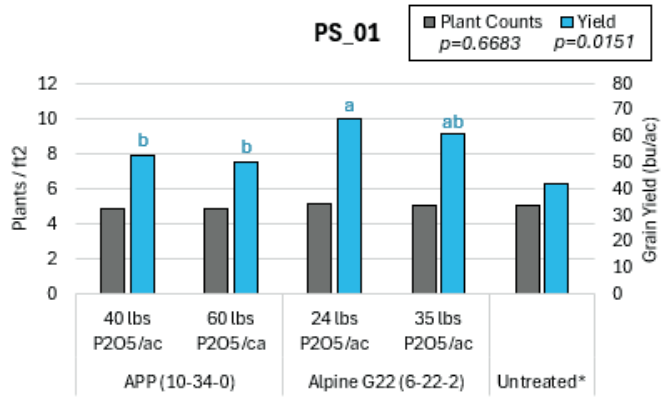
Grain Yield

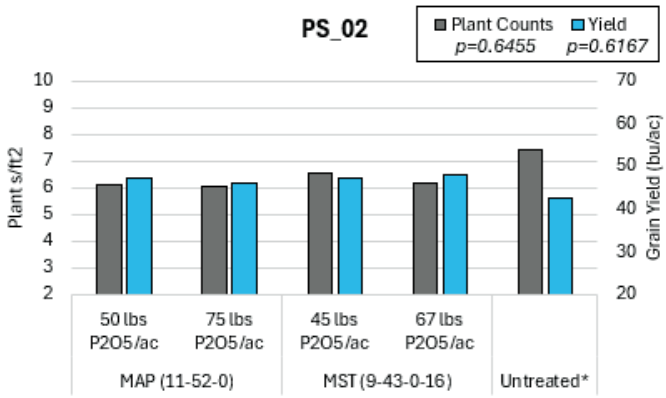
One trial location showed an influence of P Source on grain yield. The standard rate of Alpine G22 has a significant increase in grain yield compared to both rates of 10-34-0 (APP). No other trials had a significant difference in grain yield between the two P fertilizer sources when similar rates were applied.

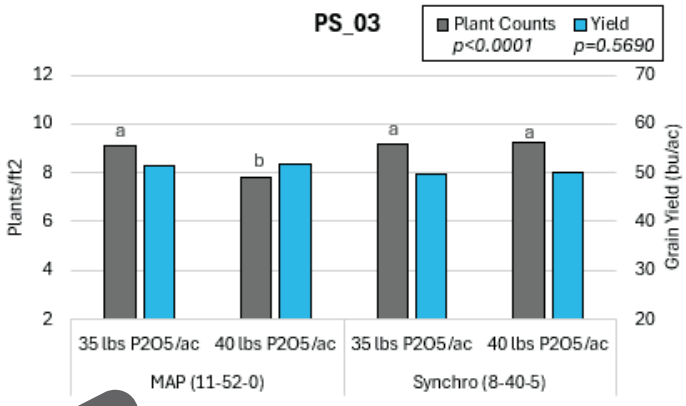
Plant Establishment

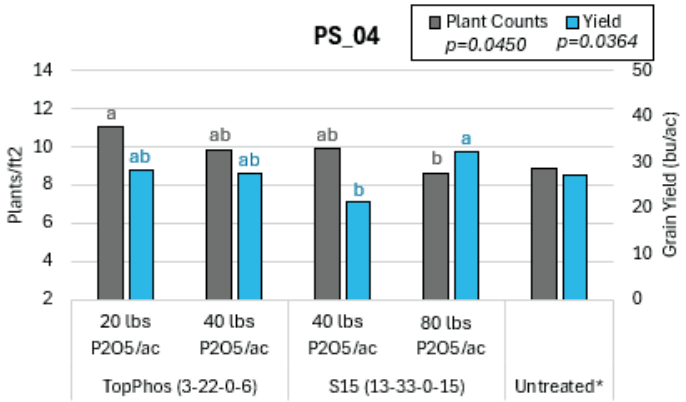
When Crystal Green Synchro was compared to 11-52-0 (MAP) there was a significant increase in emergence and plant stand with Synchro when high rates of product were applied. There were no other P fertilizer source effects on plant establishment in the 2024 trials.

All results presented are preliminary as the trial will continue to run again in 2025 field season. P availability for canola uptake is highly dependent on environmental conditions, these results are all from a single location in a single year. Caution should be used when interpreting results and making management decisions from data with limited replication.





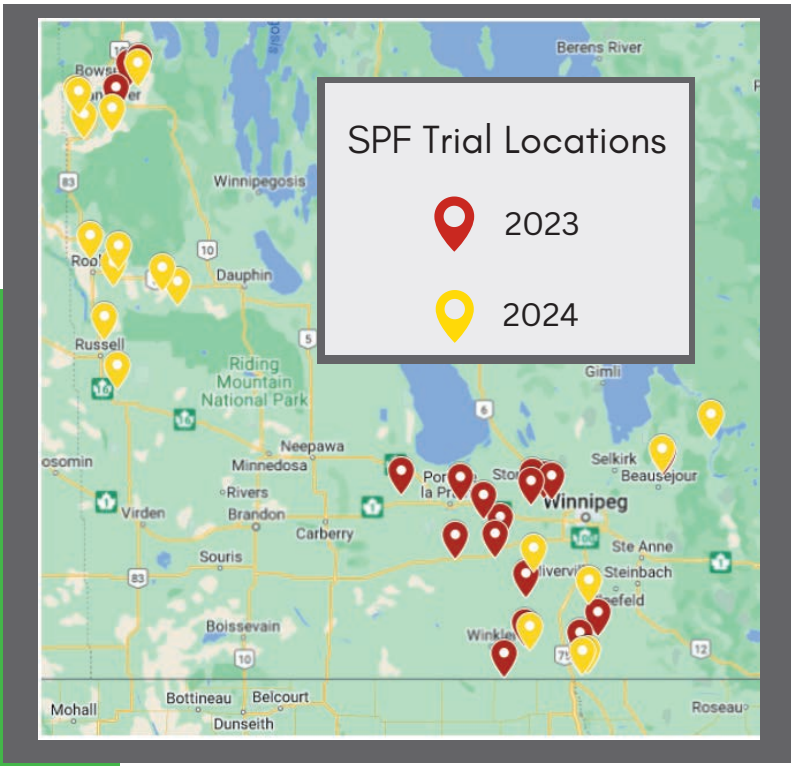




*untreated treatment was not replicated. Treatments with similar lowercase letters within a data type are not statistically different at 95% confidence. Data types with no lowercase letters indicate an insignificant treatment effect.

Summary

Seed-Placed Fertilizer Toxicity Trial



Research Question:

Are Seed-Placed fertilizer (SPF) applications being used across Manitoba safe for canola plant stand establishment and what are the major factors influencing seed safety?

Treatments:

1. No Seed-Placed Fertilizer
2. Standard Seed-Placed Fertilizer (100%)
3. High Seed-Placed Fertilizer (150%)

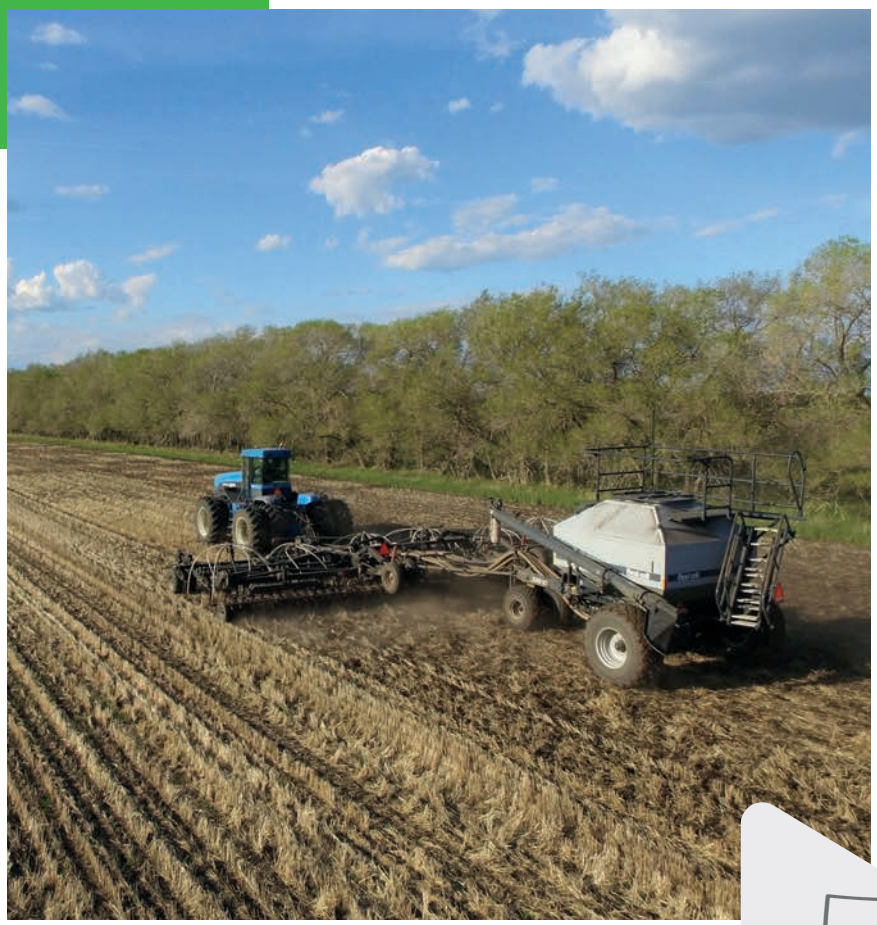
Trial Setup:

In this trial each location has one replicate of each treatment (replicated by locations). This is to allow for a wider range in testing environments (soil/rainfall), equipment (row spacing, openers, SBU), and agronomic practices (fertilizer sources and rates). This allows for the examination of the relationships between these testing factors and seed safety.

Data Collection:

Plant Counts (4 leaf), Emergence %

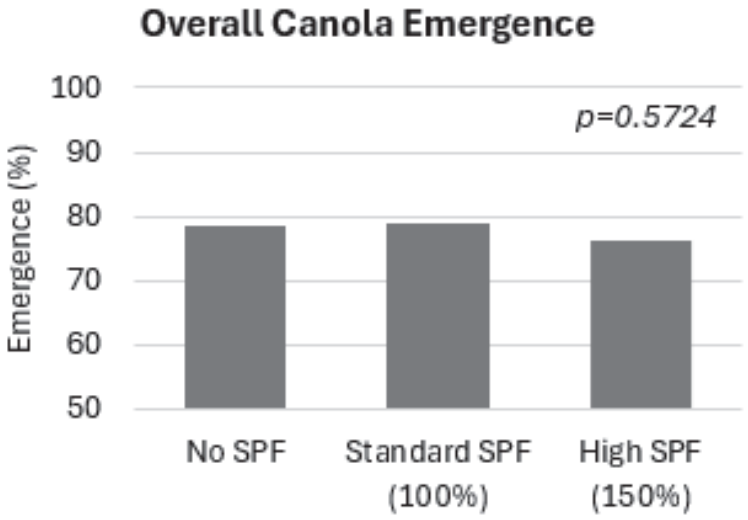
Background: Current recommendations for seed-safe levels of P and S fertilizers are much lower than crop uptake requirements. This paired with an increase in single pass seeding systems and low disturbance openers had resulted in farms pushing to increase seed applied fertilizer levels. Fertilizer toxicity is highly dependent on a number of environmental and management factors and their interactions that can vary with the growing season.



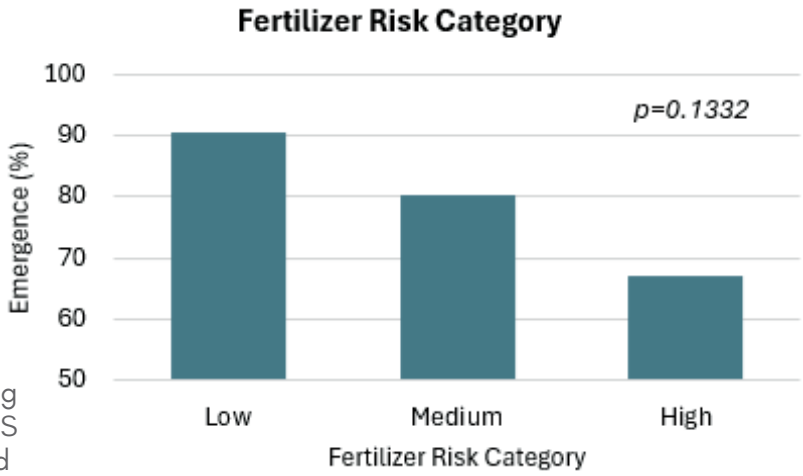
Seed-Placed Fertilizer Toxicity Trial

Preliminary Results (2023-2024)

After two years we have tested 39 locations across MB, which is not yet enough data points to conduct multivariate analysis to examine interactions between factors. Please note that the following is preliminary and does not account for multiple factors influencing toxicity and results should be interpreted with caution.
Emergence (%) = (Plants per acre at 4-leaf / seeds planted per acre) * 100
Many farms are pushing "safe" seed-placed fertilizer rates as they move towards low disturbance and one pass seeding systems and target higher yields.

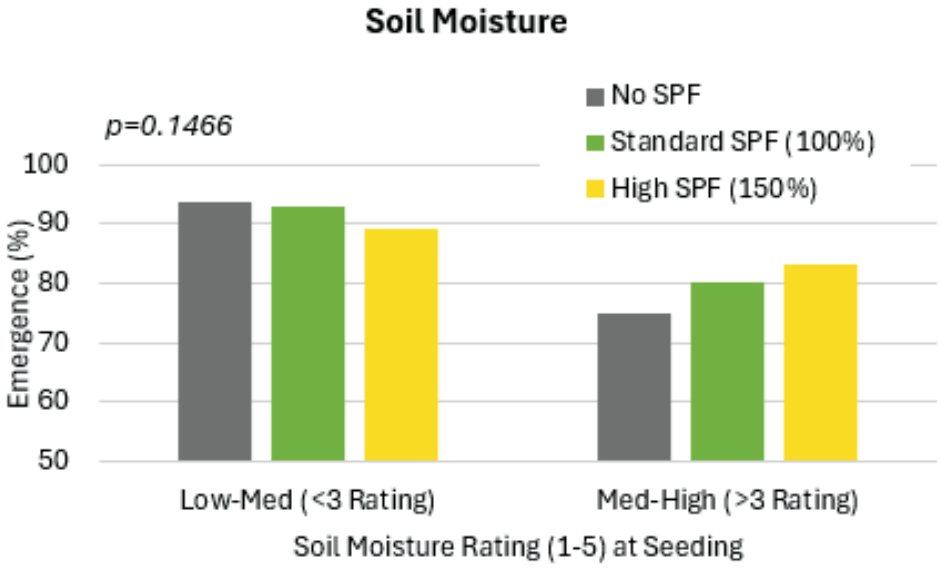


- Wet spring conditions in 2024 led to canola tolerating high rates of seed-placed fertilizer with little influence on emergence.
- There was a slight, non-significant decrease in emergence with high rates of SPF overall at all farms.



Each farm was categorized based on the farm's standard SPF Rates into the following fertilizer risk category: High Risk = N, P and S rates above recommended safe levels, Med Risk = N, P, or S rates above recommended safe levels and Low Risk = all SPF fall into recommended safe levels.

- Fertilizer risk category of a farm had a larger influence on emergence than the rate of SPF at the particular farm.



- There was a general trend for emergence to be reduced with high rate of SPF when soil moisture levels were rated low-medium. When soil moisture at seeding was rated med-high there was a trend for increased emergence as SPF rates increase.

Project Overview

Cover Cropping for Flea Beetle Management

This trial is conducted in collaboration with University of Manitoba (Lawley Lab) and is complimenting a small plot experiment looking at fall rye and oat nurse cover crops on their ability to aid in flea beetle management of canola.

Research Question:

Does using a spring planted cereal nurse cover crop with canola reduces early season flea beetle damage compared to a farm's standard practice for growing canola?

Treatments:

1. Cereal nurse cover crop seeded in the seed row with canola at planting and terminated using a herbicide when canola reaches the 2 leaf stage.
2. Control treatment following the farmer's standard practice for growing canola.

Trial Setup:

Four replicates of alternating treatments in full length field strips.

Data Collection:

Weekly flea beetle presence and damage until 3 leaf stage, weekly natural enemy sampling, canola plant counts, nurse crop plant stand counts, grain yield
Data is Being Processed, Stay Tuned for Results!

To learn more about this project and first year results from the small plot trials visit the project page on Canola Research Hub!

Agronomic Support for this Trial Provided by:

ANTARA AGRONOMY

Research FARMER FUNDED FARMER DRIVEN

2024 ON-FARM RESEARCH RESULTS

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MANITOBA CROP ALLIANCE

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Wheat
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PGR/FHB Fungicide Trials
NEW: Variety Trials

Barley
Malting Barley Nitrogen Rates
NEW: Variety Trial

Sunflower
Fungicide
NEW: Avian Control (pending emergency use approval)

Flax
Fungicide
Nitrogen Rate
NEW: Variety Trial

Corn
Starter Phosphorous
NEW: DIFM Plant Population*

Winter Wheat
Seeding Rate

*Data-Intensive Farm Management

New Whole Farm Trial: Weed Seed Control

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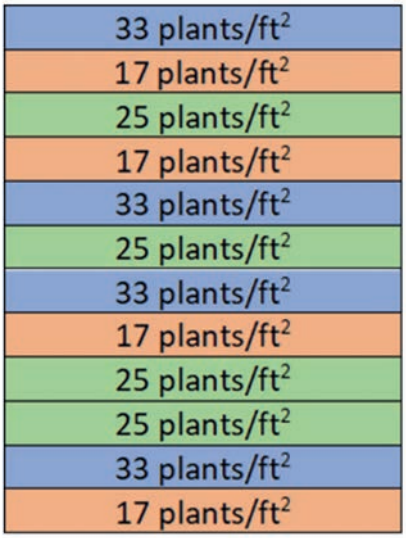
BARLEY SEEDING RATE
2024 Results

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reducing and increasing normal seeding rate in barley.

Trial information

- Five trials were established in 2024. Three trials in the eastern region (BP01, BP04, BP06), one in the interlake region (BP05) and one in the western region (BP02).
- Average seeding rate was 147 lb/ac.
- Plant stand counts occurred between 1-3 leaf stage.
- Management practices at each site were consistent across all treatments other than seeding rate.



Example of trial set up using target plant population of 25 plants/ft².

ID	Location	Variety	Row Spacing	Harvest Date	Seeding rate (lb/ac)	Plant Stand/ft²	Yield (bu/ac)	Significance @ 95%
BP01	De Salaberry	AAC Connect	10"	Aug. 14	120	24.6^{c}	124.15	No
					150	28.5^{b}	117.16	
					180	33.5^{a}	117.13	
BP02	Grassland	CDC Austenson	10"	Aug. 15	175	23	131.9^{c}	Yes
					200	23.67	126.4^{b}	
					225	30.09	129.5^{a}	
BP04	De Salaberry	CDC Austenson	10"	Aug. 20	124	21.92	94.93	No
					149	27.25	91.89	
					174	26.34	92.36	
BP05	Balmoral	CDC Austenson	10"	Aug. 21	90	21^{b}	114.7	No
					110	26^{ab}	115.6	
					130	29.6^{a}	113.5	
BP06	Tyndall	AAC Synergy	10"	Sept. 2	95	18.66	48.74	No
					120	22.89	50.28	
					145	24.55	53.82	

Superscript lettering indicates those that are statistically significantly different.

For 2022 and 2023 barley seeding rate trial results, visit **mbcropalliance.ca.**

BARLEY SEEDING RATE

2022-2024 Results

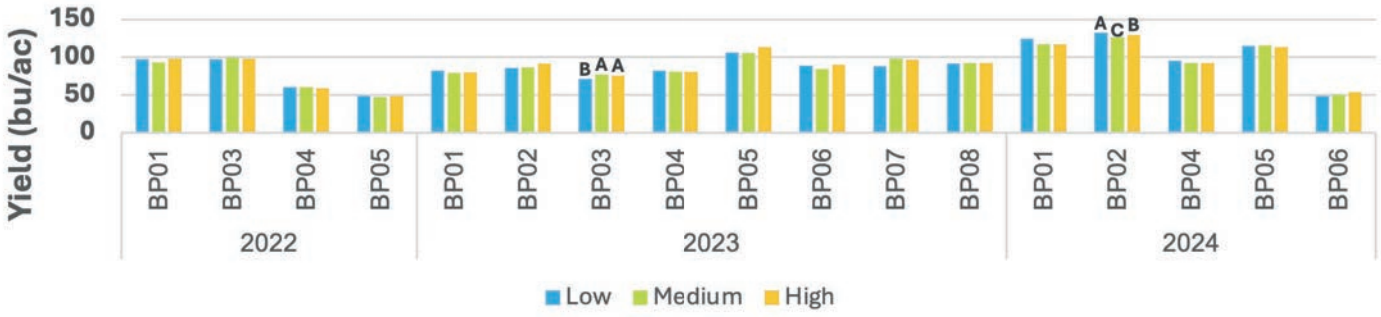
Trial Information: Since 2022, 17 barley seeding rate trials have been established throughout Manitoba.

Supporting Data:

- Throughout the trial period, seeding rates ranged from 78–225 lb/ac. Low, medium and high seeding rates differed by 12–28 per cent depending on location.
- 11 sites planted feed barley and six planted malting barley. CDC Austenson (feed) and AAC Connect (malting) were the most commonly planted varieties.

Average Plant Stand Count/ft²

Average Yield Seeding Rate Trials



Results: At eight of 17 sites, seeding rate had a significant effect on plant counts. In these cases, the highest seeding rates resulted in the highest plant population. At two of 17 trial sites, there was significant differences in yield between the three seeding rates tested. These differences were marginal and did not results in an increase in profit due to extra cost of seed at planting. In one case, the lower seeding rate resulted in higher overall yield. Overall, at most sites, grain yield was not affected by a change in seeding rate from normal practice.

Summary: Manitoba farmers are achieving recommended plant densities of 22–25 plants/ft². This study indicates this is achieving optimal yield.

Additional Considerations: Lower seeding rate and plant populations can reduce crop competitiveness to field pests. Uniformity of crop maturity will be more variable with lower seeding rates, reducing crop protection product efficiencies.

BARLEY SEED TREATMENT

2024 Results

Objective: The purpose of this project is to quantify the agronomic and economic impacts of using a seed treatment on barley.

Trial information

- Two trials were established in 2024: one in the western region (BST02) and one in the central region (BST01).
- Treatments included EcoTea and Raxil Pro.
- Plant stand counts occurred between 1-3 leaf stage.
- Management practices at each site were consistent across all treatments other than seed treatment.

Product information:

- Raxil Pro is a fungicide seed treatment with contact and systemic activity. Raxil Pro has Group 3 and 4 components, providing control or suppression on seed rots, seedling blight, damping-off, true and false loose smut, and covered smut.
- EcoTea is a bioinoculant seed treatment. It covers the seed with microbes such as bacteria, fungi and protozoa. This product provides faster germination and improved root development.

Example of trial set up.

ID	RM	Variety	Seeding rate (lb/ac)	Treatment	Harvest date	Plant stand/ft²		Yield (bu/ac)		Significance @ 95%?
						Treated	Untreated	Treated	Untreated	
BST01	Morris	AAC Synergy	110	EcoTea (5gal/ac)	Aug. 12	20.9	21.2	119.77	120.1	No
BST02	Wallace-Woodworth	AAC Connect	96	1x Raxil Pro	Aug. 21	17.9	19.5	105.1	104.6	No

For 2023 barley seed treatment trial results, visit **mbcropalliance.ca**

BARLEY SEED TREATMENT

2023-2024 Results

Trial Information: This trial has been conducted at four sites in Manitoba over the past two growing seasons.

Supporting Data:

- Trials have been conducted in both the central and western region of Manitoba.
- Malting barley varieties AAC Synergy and Connect were grown in this trial.
- In 2023, BST01 used Eco Tea and BST02 used Raxil Pro.

Results: No significant differences in in plant density were found between the treated and untreated plots.

Similarly, zero out of four sites in this trial showed significant yield differences. Seed treatment had no significant impact on plant density or yield. As a result, treatments including seed treatment reduced profit by $5-10/ac.

Summary: Understanding seed source, variety disease resistance ratings, field disease history, length and diversity of crop rotations, and seeding practices will help you evaluate disease risks and the need for seed treatments. Use a similar strategy to determine if an insecticide seed treatment is also necessary.

Spring weather conditions can be variable by year. A broad-spectrum seed treatment can help mitigate disease risk.

MALT BARLEY NITROGEN RATE AND PROTEIN

2024 Results

NEW TRIAL in 2024

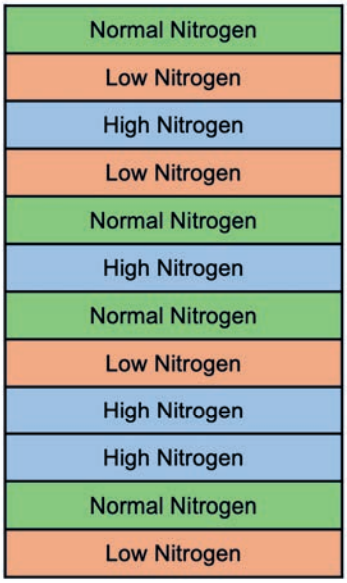
Objective: The purpose of this project is to quantify the agronomic and economic impacts of increasing nitrogen rates from the producer's normal nitrogen rate in the latest malt barley varieties.

Background information:

- Newer malting barley varieties have been released and are starting to account for many of the seeded acres.
- Understanding the new varieties' fertility requirements, specifically for nitrogen, is crucial to optimize these varieties for yield and malt selection.

Trial information

- Four trials took place in the 2024 season: three trials in the western region (BN01,BN02, BN03) and one in the eastern region (BN04).
- The average nitrogen applied was 86.5 lb/ac.
- Plant stand counts occurred between 1–3 leaf stage.
- Management practices at each site were consistent across all treatments other than nitrogen applied.



Example of trial set up testing both higher and lower vs. the grower's normal rate.

ID	RM	Variety	Seeding rate (lb/ac)	Harvest date	Nitrogen rate (lb/ac)	Plant height (cm)	Lodging* (1-9)	Yield (bu/ac)	Significant @ 95% ?
BN01	Oakland-Wawanesa	AAC Synergy	96	Aug. 10	77	79	1	97.84[b]	Yes
					90	81	1	110.33[a]	
					104	82	1	111.59[a]	
BN02	Alexander	AAC Synergy		Sept. 4	80	88	5	87.87	No
					100	86	5	90.17	
					120	88	5	89.34	
BN03	Wallace-Woodworth	AAC Connect	96	Aug. 21	79	85	1	102.15[a]	Yes
					90	89	1	100.72[a]	
					100	88	1	97.2[b]	
BN04	Brokenhead	AAC Synergy	120	Sept. 2	60	67	1	52.9	No
					66	70	1	49.6	
					72	78	1	53.93	

Superscript lettering indicates those that are statistically significantly different.

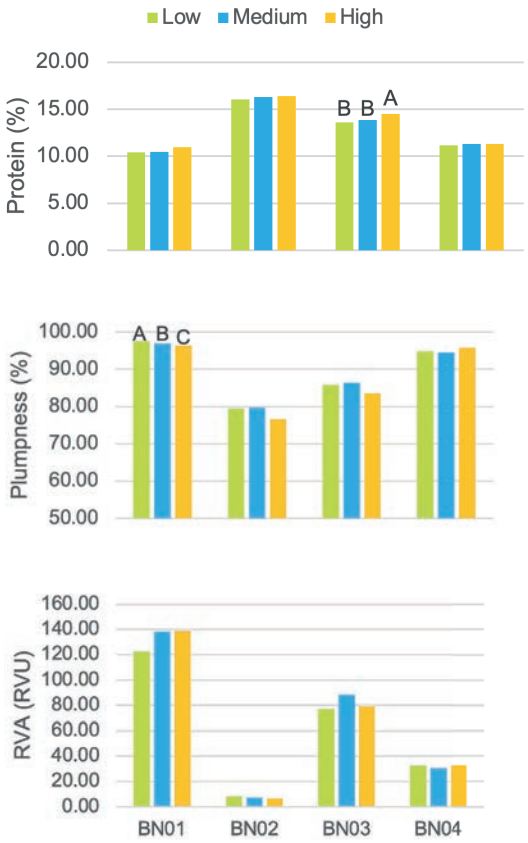
**Lodging is rated on a 1–9 scale, where 1 is no lodging and 9 is completely flat.*

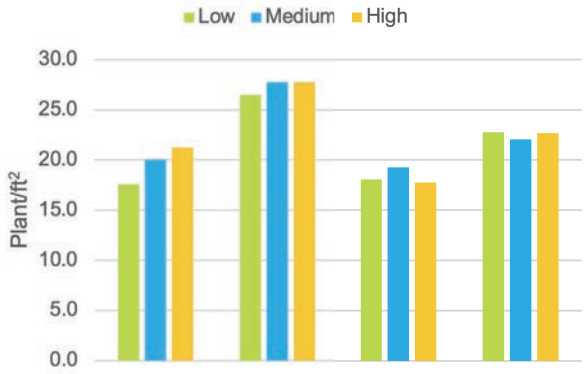
Interested in participating in this trial in 2025? Visit **mbcropalliance.ca** to sign up.

MALT BARLEY NITROGEN RATE AND PROTEIN

2024 Results

Analysis: In addition to the baseline data collection, grain quality for malt selection was also assessed at the Canadian Malting Barley Technical Centre. Parameters measured included grain protein, germination energy and kernel plumpness.





RVA: A measure of pre-harvest germination in barley. The higher the RVA number, the less pre-harvest sprouting has occurred. RVA is measured in Rapid Visco Units (RVU). Values above 120 RVU indicate low pre-harvest sprouting, which is desired by the malting industry.

Superscript lettering indicates a statically significantly different at P<0.05.

Results: These are preliminary results. No significant differences in plant population were observed between nitrogen treatments. Only BN04 had all treatments with a plant density between the recommended target plant population values.

Significant yield differences were observed at **two of the four** sites or **50 per cent**. In these trials, grain yields of the "normal" nitrogen rate were not significantly different from the highest-yielding treatment. In this trial year, there was no **economic gain due to yield** for increasing the rate of nitrogen applied.

Two of the four sites had protein levels that were below 12.5 per cent, but only one site had significant protein differences between nitrogen treatments, with the highest nitrogen treatment having the highest protein level. **Three out of four** sites had moderate to severe pre-harvest sprouting, with RVA values below 120 RVU. Finally, **one out of the four** site had significant differences in kernel plumpness, with kernel plumpness increasing with decreased nitrogen rate. Although, the decreased plumpness of the higher nitrogen rate treatment was not below the minimum desired level of 90 per cent.

SPRING WHEAT ULTRA EARLY PLANTING

2024 Results

NEW TRIAL in 2024

Objective: The purpose of this project is to quantify the agronomic and economic impacts of seeding date on spring wheat. Early planting was determined using soil temperature of 2–5 °C.

Background

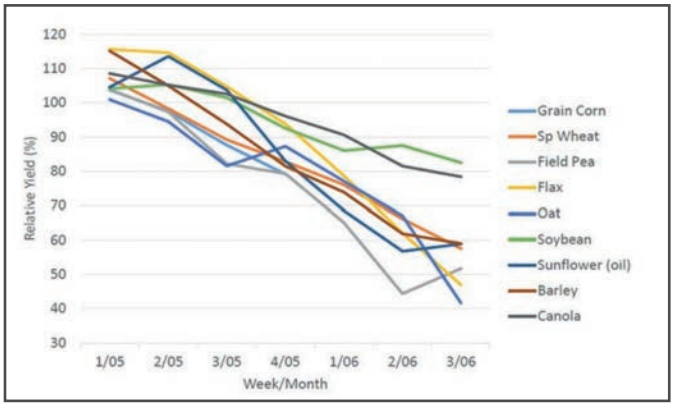
- Recent research from Collier et al. (2021) explored seeding spring wheat by soil temperature, rather than by calendar date.
- They investigated if early seeded wheat can make better use of early season moisture and miss extreme summer heat during flowering and grain filling. However, early seeding comes with risk, such as frost, poor emergence and slow growth.
- Results showed that initiating seeding into soil with temperatures between 2–6 °C resulted in no negative effects on wheat yield or protein, when compared to seeding at 8°C.
- The Collier et al (2021) study did not include research sites located in Manitoba. Current MASC data suggests that seeding early is important to maximize yield.

Early Seeding
Normal Seeding
Normal Seeding
Early Seeding
Normal Seeding
Early Seeding
Early Seeding
Normal Seeding

Example of trial set up.

Early (left) and late (right) seeding at trial in St. Pierre, MB.

2010–2019: Seeding Date vs. Average Yield Response



Source: Manitoba Agriculture Service Corporation

Minimum germination temperatures for various crops.

Crop	Temperature (°C)
Wheat	4
Barley	4
Oat	4
Corn	10
Canola	5
Flax	9
Sunflower	6
Edible Beans	10
Peas	4
Soybeans	10

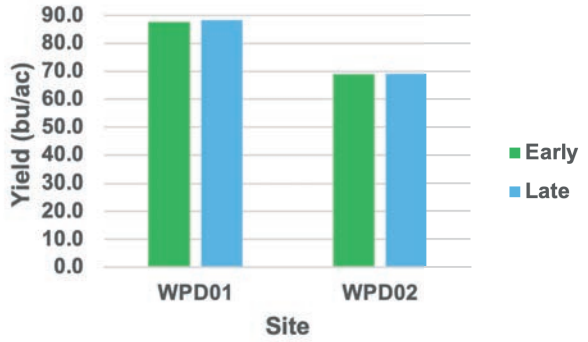
SPRING WHEAT ULTRA EARLY PLANTING

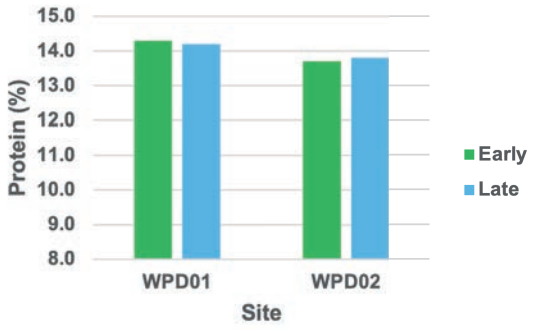
2024 Results

Trial information

- Two trials took place in the 2024 season: one trial in the central region (WPD01) and one trial in the eastern region (WPD02).
- Plant stand counts occurred between 1–3 leaf stage.
- Management practices at each site were consistent across all treatments and with remainder of the field for all practices other than planting dates.

ID	RM	Variety	Seeding rate (lb/ac)	Seeding date	Plant stand/ft²	Plant height (cm)	Moisture %	Harvest date
WPD01	Grey	AAC Starbuck VB	129	Early (April 15)	40.0	91	15.3	Aug. 23
				Normal (April 22)	44.0	89	15.3	
WPD02	De Salaberry	AAC Brandon	128	Early (May 1)	25.1	94	14.4	Aug. 26
				Normal (May 9)	28.9	94	14.5	





Results: No significant yield or protein differences were found between planting dates. This year, planting early did not significantly impact wheat yield or protein levels.

Summary: Trends cannot be determined this year, as this is only the first year of data. Due to moist conditions at spring seeding, this approach may not be a viable option every year.

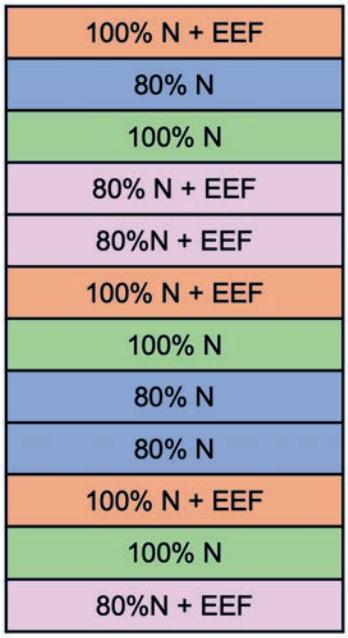
SPRING WHEAT ENHANCED EFFICIENCY FERTILIZER

2024 Results

Objective: The purpose of this project is to quantify the agronomic and economic impacts of enhanced efficiency fertilizer (EEF) usage on wheat for yield and grain quality. Both UAN and Urea were considered.

Trial information

- Two trials took place in the 2024 season: one trial in the central region (WN01) and one trial in the eastern region (WN02).
- Both EEF products were urease inhibitors, providing protection against ammonia volatilization. The two products were Agrotain and Anvol.
- Management practices at each site were consistent across all treatments and with remainder of the field for all practices other than nitrogen rate and use of EEF.



Example of trial set up.

ID	RM	Variety	Seeding rate (lb/ac)	Harvest date	Treatment	Plant height (cm)	Lodging* (1-9)	Yield (bu/ac)	Significant difference?
WN01	North Cyprus-Langford	Bolles	120	Aug. 20	111N	87	1	96.9	No
					111N + Agrotain	83	1	98.57	
					138N	85	1	97.83	
					138 N + Agrotain	85	1	93.26	
WN02	Brokenhead	AAC Starbuck VB	104	Aug. 28	172N	86	2	78.21	No
					172N + Anvol	86	1	78.17	
					215N	86	2	78.63	
					215N + Anvol	88	2	79.1	

**Lodging is rated on a 1-9 scale, where 1 is no lodging and 9 is completely flat.*

To see 2022 and 2023 results, visit **mbcropalliance.ca** to sign up.

SPRING WHEAT ENHANCED EFFICIENCY FERTILIZER

2022-2024 Results

Trial information: This trial has been conducted at four sites in Manitoba over the past three growing seasons.

Supporting data:

- The enhanced efficiency fertilizer (EEF) products used in these trials ranged from urease inhibitors to dual inhibitor products that contain both nitrification inhibitors and urease inhibitors.

Results: There have been no significant yield differences observed between treatments at any of the sites.

There were no significant protein differences between nitrogen treatments. Protein levels for all treatments and sites were 13.5 per cent or higher.

Summary: At these trial sites, using EEF did not increase yields compared to the traditional nitrogen products. EEFs have been found to reduced nitrogen loss, especially when conditions of high nitrogen loss exist. High-risk conditions include when there is excess soil moisture, or when urea fertilizers are broadcasted and rainfalls are not subsequently received.

SPRING WHEAT BIOLOGICAL FIXING NITROGEN PRODUCTS

2024 Results

NEW TRIAL in 2024

Objective: The purpose of this project is to quantify the agronomic and economic impacts of the biological fixing nitrogen product Envita on spring wheat for yield and grain quality.

New Product Testing

- Envita features the bacteria *Gluconacetobacter diazotrophicus* (Gd) that enables a unique mode of nitrogen fixation in wheat and other crops.
- After application, the bacteria start replicating and spreading through plant foliage and roots, forming a relationship with the host plant. The bacteria fix nitrogen from the air inside the plant cells.
- This provides plants with an additional source of nitrogen where and when it's needed, supplementing the supply of nitrogen available from fertilizer treatments.

Trial information

- Two trials took place in the 2024 season: one trial in the central region (WB02) and one trial in the western region (WB01).
- Management practices at each site were consistent across all treatments and with remainder of the field for all practices other than nitrogen rate and application of Envita.

100% N
80% N +Envita
80% N
100% N
80% N + Envita
80% N
80% N
80%N + Envita
100% N
100% N
80%N + Envita
80% N

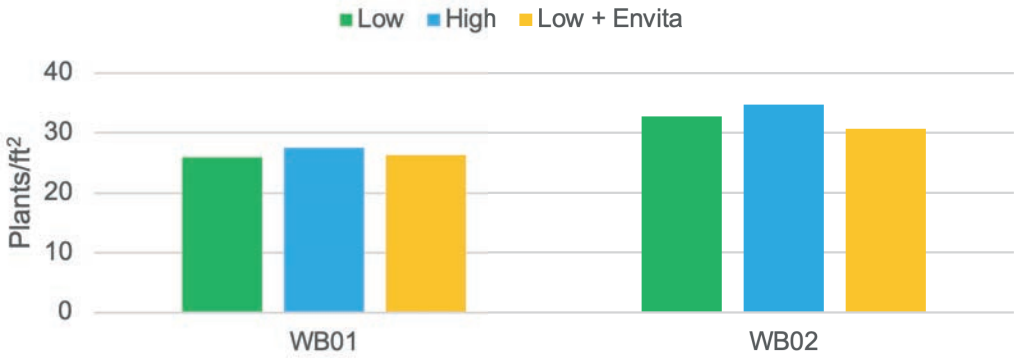
Example of trial set up.

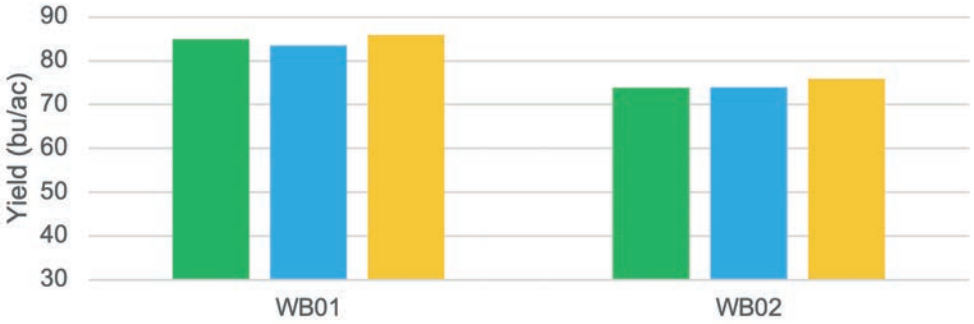
ID	RM	Variety	Seeding rate (lb/ac)	Harvest date	Treatment	Yield (bu/ac)	Significant @ 95%?
WB01	Grassland	AAC Wheatland VB	115	Aug. 31	80% Nitrogen	84.93	No
					80% N + Envita	86.1	
					100% Nitrogen	83.52	
WB02	Lorne	AAC Starbuck VB	132	Sept. 26	80% Nitrogen	73.82	No
					80% N + Envita	75.88	
					100% Nitrogen	73.96	

Interested in participating in this trial in 2025? Visit **mbcropalliance.ca** to sign up.

SPRING WHEAT REDUCED NITROGEN/BIOLOGICAL

2024 Results





Summary: This year's results demonstrate the application of Envita did not significantly improve wheat yields or quality over the standard or reduced nitrogen rates. Therefore, the cost of Envita was not made up by an increase in yield or quality and there was a profit loss of approximately **$15/ac** compared with the treatments with the same nitrogen rate.

WINTER WHEAT SEEDING RATE

2024 Results

NEW TRIAL in 2024

Objective: The purpose of this project is to quantify the agronomic and economic impacts of reduced and increased targeted plant stand of a normal seeding rate in winter wheat.

Trial information

- All trials were established in the fall of 2023.
- Seven trials were established, two experienced winter kill, resulting in five trials taken to harvest: one in the central region (WWP03), two in the western region (WWP04, WWP05), one in the eastern region (WWP06) and one in the parkland region (WWP07).
- The average seeding rate was 135 lb/ac.
- Management practices at each site were consistent across all treatments and with remainder of the field for all practices other than seeding rate.

33 plants/ft^2
17 plants/ft^2
25 plants/ft^2
17 plants/ft^2
33 plants/ft^2
25 plants/ft^2
33 plants/ft^2
17 plants/ft^2
25 plants/ft^2
25 plants/ft^2
33 plants/ft^2
17 plants/ft^2

Example of trial set up.

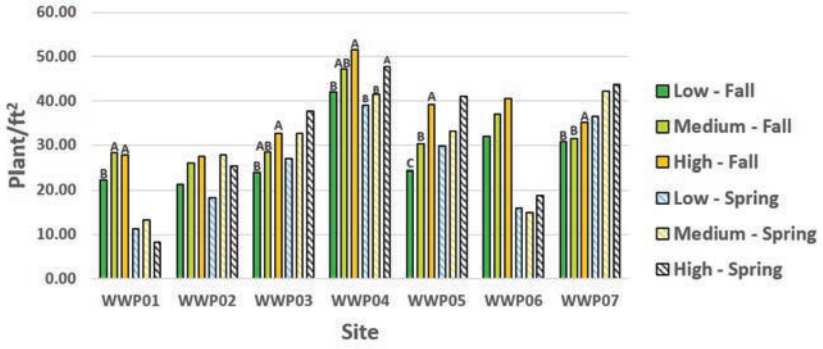
ID	RM	Variety	Seeding rate (lbs/ac)	Row spacing	Previous Stubble	Seeding Date	Harvest date
WWP03	Louise	AAC Wildfire	97 127 157	10"	Canola	Sept. 12	Aug. 18
WWP04	Oakland-Wawanesa	AAC Wildfire	130 160 190	5"	No Stubble	Sept. 13	Aug. 21
WWP05	Riverdale	AAC Wildfire	90 120 150	10"	Canola	Sept. 15	Aug. 13
WWP06	St.Clements	AAC Vortex	130 150 170	10"	Canola	Sept. 27	Aug. 13
WWP07	Dauphin	AC Emerson	90 120 150	10"	Canola	Sept. 27	Aug. 28

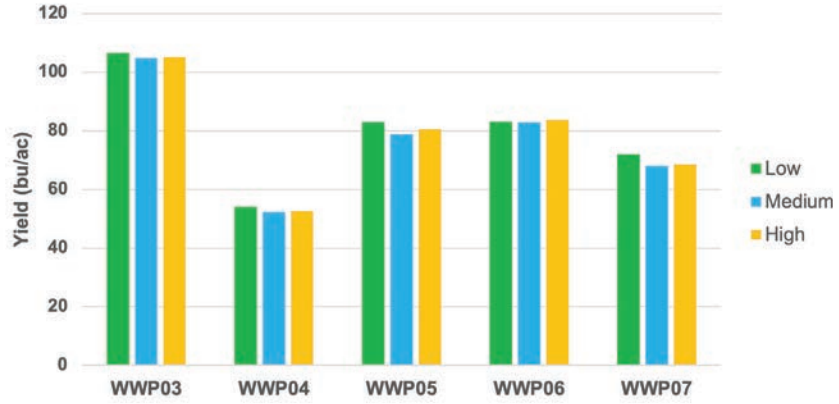
Superscript lettering indicates those that are statistically significantly different.

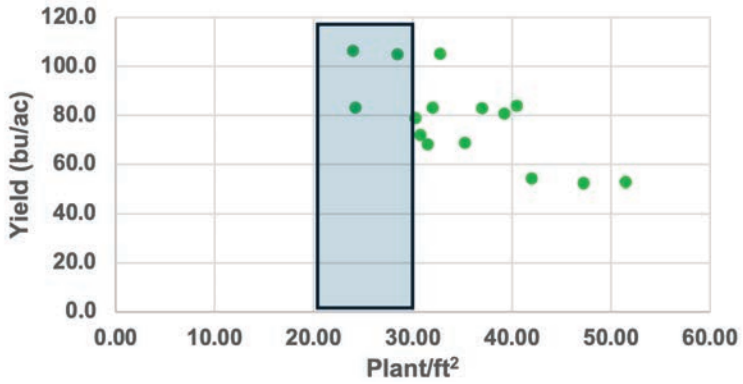
Interested in participating in this trial in 2025? Visit **mbcropalliance.ca** to sign up.

WINTER WHEAT SEEDING RATE

2024 Results







Shaded area represents Manitoba Agriculture recommended plant density.

Results: Significant plant stand differences were observed between seeding rate treatments in both the fall and spring plant counts. Four out of the five sites that were taken to yield had significant differences between fall plant stands, with the lowest seeding rate always having the lowest plant density. One out of the five sites taken to yield had significant differences between spring plant stands. All sites reached or surpassed the recommended plant stand density for winter wheat of 20–30 plants/ft^2.

There were no significant yield differences observed between seeding rate treatments. At most sites, the lowest seeding rate had the highest yield, but not statistically significant. As seeding rate increased, there was a decrease in profits. The lowest seeding rate was the most profitable at all trial sites, saving approximately $8.50/ac compared to the normal rate.

NOTES

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