Project Identification

1. **Project Title:** Demonstrating Faba Bean Inoculant Types and Application Methods
2. **Project Number:** 20200503
3. **Producer Group Sponsoring the Project:** Saskatchewan Conservation Learning Centre
4. **Project Location(s):** Located at the Conservation Learning Centre located 18 km south of Prince Albert (SE 20-46-26-W2 RM 461). Coordinates of corners:
   N53˚01.734' W105˚45.564'
   N53˚01.741' W105˚45.529'
   N53˚01.724' W105˚45.563'
   N53˚01.729' W105˚45.526'
5. **Project start and end dates (month & year):** April 2021 to February 2022
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Objectives and Rationale

7. Project objectives:

This project was intended to demonstrate various inoculant options and application methods for faba bean producers in the north-central region. The project also provided insights into the costs and benefits of various inoculant types for producers.

8. Project Rationale:

Faba beans are well suited to the Parkland region in north-central Saskatchewan because they grow best under moist and cool conditions (Saskatchewan Pulse Growers, 2020). They have been regarded as part of the next generation of plant protein due to their high grain protein content and could make a valuable addition to local crop rotations (Pratt, 2019). In recent years, many new inoculants for faba beans have come onto the market, and many other pulse inoculants have been registered for use on faba beans. These inoculants come in three forms: a fine peat-based powder that needs to adhere to seed, a liquid product consisting of rhizobia suspended in a solution that is applied on seed or in-furrow, and peat- or clay-based granules which are applied in-furrow. Peat-based inoculants are less prone to damage from desiccation and seed treatment when compared to liquid varieties (Alberta Pulse Growers, n.d.). However, they are more likely to cause bridging and clumping issues than other inoculant types. Liquid inoculant can be applied to the seed being augured into seedboxes, which saves farmers the added step of applying the inoculant to the seed and allows for precise application. Granular is the least prone to exposure damage and also allows for more precise application rates than peat-based products. Granular inoculant also tends to be the most expensive, is bulky to handle, and requires ample storage space. For novel faba bean producers, choosing between peat, liquid, and granular inoculants may be difficult without having prior experience with these products. Even within a certain inoculant type, there are multiple products available for producers, and some have extra additives such as P-solubilizing bacteria, growth-promoting technology, and mycorrhizal inoculant. The CLC had been approached by a local producer in the fall of 2020, who noticed major differences in production between sections of his field that were inoculated with different granular products. Several producers in the area had also mentioned seeing differences in faba bean inoculant products and had a keen interest in the subject of inoculant types.

Several studies have been conducted in the past few years comparing different faba bean inoculant types. However, the results of these studies have been variable. A 2015-2017 trial evaluating peat and granular faba bean inoculants at several Saskatchewan AgriARM sites, found no significant differences between the un-inoculated check and inoculated treatments (Hnatowitch, 2016 and 2017). The principal investigator for the study hypothesized that this was due to a high population of native rhizobia in the soil leftover from many years of pulse crop production. The investigators concluded that farmers should still use inoculants when producing faba beans, but that more inexpensive products could likely be used and that it is not necessary to apply multiple types at once or to apply inoculants at a higher than recommended rate.

Similarly, a study from Alberta in 2014 compared peat, granular and liquid faba bean inoculants, and found no visible benefits to the inoculants, likely due to high populations of indigenous rhizobia in the area (Lopetinsky et al., 2014). In this case, the researchers concluded that inoculating faba bean is not necessary for all soils. A 2017 Australian study on faba bean inoculant types found that peat slurry treatments had significantly higher N fixation and yield compared to liquid inoculant treatments (Denton et al., 2017). The take-away from these studies seems to be that inoculant type can affect production significantly, but this effect will not be present in areas with large numbers of native rhizobia and is very dependent on local growing conditions. Additionally, differences between inoculant types are generally not very pronounced except under certain conditions (Fleury, 2017). For instance, under dry spring conditions, granular inoculant tends to perform best, followed by peat, then liquid. Given the variability of the results from previous studies on this topic and the impact of local growing conditions on the efficacy of the inoculant, a study in the Prince Albert region would provide helpful insights for local faba bean producers

Faba beans provide a good alternative to peas and lentils in a rotation, because they are moderately resistant to Aphanomyces root rot, which is a major issue in many fields across north-central Saskatchewan. Up until recently, faba bean production in the province has been limited by market demand (Pratt, 2019). This is likely to change quickly in the near future with the recent opening of C-Merak, a faba bean processing and fractionation facility located in Tisdale. This facility can accommodate 200,000 acres of production annually (Pratt, 2019). With a growing demand for fabas, farmers may be looking for guidance in producing this new crop. Another reason faba beans may make an excellent addition to local crop rotations is that faba beans are considered the most efficient nitrogen fixer of all the pulse crops grown in western Canada (Saskatchewan Pulse Growers, 2020).

This study included a simple cost analysis in order to help local farmers determine what inoculants best suit their needs. Having an estimate of the costs associated with each inoculant type, as well as its effects on yield, and plant growth, allows producers to make more informed decisions when choosing their inoculant. If Saskatchewan soils are high enough in native rhizobia, inoculants may not have an effect on yield. Hnatowitch's multi-year study suggested local producers may be overspending on inoculant due to the presence of native soil rhizobia (Hnatowitch, 2016 and 2017).

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Methodology and Results

9. Methodology:

This trial was set up with a randomized complete block design. Seven treatments were used to evaluate different inoculant types and methods of application. The treatments were replicated four times. A description of all treatments can be found in Table 1.

Table 1. Treatments used in “Demonstrating Faba Bean Inoculant Types and Application Methods”

Trt #	Inoculant	Application Method
1	None - Check	N/A
2	BASF Nodulator FB Peat	On-seed
3	AGTIV Peat Rhizo Powder for pulses	On-seed
4	Verdesian Primo Pulse Liquid	On-seed
5	XiteBio PulseRhizo Liquid	On-seed
6	TagTeam BioniQ Granular	In-furrow
7	AGTIV Pulses Granular	In-furrow

Treatment plots measured two by seven meters. The trial was seeded into oat stubble with a Fabro Plot Seeder on May 11th. An agronomic summary can be found in Table 2. In the spring of 2021, composite soil samples were collected from the trial area and were submitted to Agvise Laboratories for analysis. Faba beans were fertilized with a yield goal of 3902 lb/ac. Fertilizer recommendations were based on soil test results (Tables 2, 6). On September 14th, a Wintersteiger Quantum plot combine was used to harvest the entire plot. Crops were scouted periodically for pests and disease. Chocolate spot pressure was very high. Unfortunately, there are currently no available fungicides for the control of chocolate spot in faba beans. Miravis Neo 300 SE fungicide was applied in the hopes of slowing the disease spread, but it did not seem to have much effect.

Table 2. Agronomic summary.

Seeding date:	May 11th, 2021
Seeding Method:	Fabro plot seeder with double disc openers and 10 in row spacing
Seeding Rate:	Snowbird faba bean at 276.04 kg/ha, target 45 plants/m^2
Soil Temperature at Seeding:	11.7°C
Stubble	Oat
Seed Depth:	2.5 inches
Fertilizer:	MAP (11-52-0) at 58.43 kg P/ha
Inoculation Method:	Treatments were inoculated using recommended label rates and seeded within 4.5 hours of application. Peat and liquid inoculants were applied on-seed and granular products were applied in-furrow at seeding.
Emergence:	Around May 20th
Post-Emergent Herbicide:	Poast Ultra at 0.3 L/ac with Merge at 0.75 L/100 L of spray solution on June 22nd
Fungicide:	Miravis Neo 300 SE at 505 mL/ac July 12th
Spring Plant Density:	2 x 1 m rows were counted per plot counted on June 15th
Height:	Recorded at the front and back of each plot to the nearest cm on August 23rd
Nodulation:	Assessed on July 7th based on the methods described in the Saskatchewan Pulse Growers' Nodulation Assessment Guide
Harvest Aid:	Reglone Ion at 0.83 L/ac with 200 L of water/ac on August 19th
Harvest Date:	September 14th, 2021
Harvest Method:	Entire plot with a Wintersteiger Quantum Plot Combine. Samples were cleaned, weighed and corrected to 16% moisture.
Soil Zone and Texture	Black Clay loam

Data collected included date of emergence, spring plant density counts, assessment of nodulation, height, and vigour, thousand kernel weights and test weights, grain protein and quality analysis, and an economic analysis. Data collection methods are presented in Table 2. Samples were sent to SGS Canada Inc for protein and feed quality analysis. For the economic analysis, the cost of the inoculants and differences in the returns from yields between treatments was evaluated.

Product Breakdown

A summary of the components of each of the inoculant products used can be found in Table 3 below. Faba beans are inoculated by the bacteria *Rhizobium leguminosarum,* the main component in all the inoculant formulations used. Verdesian Primo Pulse liquid inoculant also includes Take Off, a proprietary technology that is said to help the plant more efficiently acquire and assimilate nitrogen, and *Azospirillum brasilense*, a bacteria that stimulates plant growth and nutrient uptake (Verdesian Life Sciences, 2022; Barker, 2019). XiteBio PulseRhizo liquid contains advanced growth promoting technology, a proprietary blend of rhizobia (XiteBio, 2022). TagTeam BioniQ has 4 main components in addition to the *Rhizobium*, 1) signals called lipochitooligosaccharides that are produced by rhizobia during the inoculation process, 2) *Penicillium bilaiae* to solubilize phosphate, and 3&4) the plant growth promoting rhizobacteria *Bacillus amyloliquefaciens* and *Trichoderma virens* (Barker, 2019). AGTIV Pulses includes *Glomus intraradices,* a mycorrhizal fungus (Barker, 2019).

Table 3. Breakdown of the components of the inoculant products used in the faba bean inoculant trial.

#	Inoculant	Description	Non N-Fixing Technology
1	None – Check	N/A	
2	BASF Nodulator FB Peat	*R. leguminosarum* biovar *viceae*	
3	AGTIV Peat Rhizo Powder for pulses	*R. leguminosarum* biovar *viceae*	
4	Verdesian Primo Pulse Liquid	*Rhizobium, Azospirillum brasilense* and Take Off	Plant growth promoting rhizobacteria and N catalyst
5	XiteBio PulseRhizo Liquid	*R. leguminosarum* and AGPT[1]	AGPT[1]
6	TagTeam BioniQ Granular	*Rhizobium*, LCO[2], *Penicilliom bilaiae, Bacillus amyloliquefaciens, Trichoderma virens*	LCO[2], P[3] and biologicals for increased nutrient availability
7	AGTIV Pulses Granular	*Rhizobium leguminosarum* and *Glomus intraradices*	Mycorrhizal fungi

[1]AGPT = advanced growth promoting technology
[2]LCO = lipochitooligosaccharide technology
[3]P = phosphate solubilizing/enhancing

Data analysis was completed by ANOVA using Statistix 10 software. Any non-parametric data was analyzed using the Kruskal-Wallis test. Post-hoc tests used were LSD for parametric data and Dunn's multiple comparisons test for non-parametric data.

10. Results

Weather

The 2021 growing season at the CLC was very hot and dry compared to past years (Table 4). The average temperature for the entire growing season was nearly 1˚C warmer than the long-term average. Total precipitation was 97.1 mm lower than the long-term average. Precipitation was very low in May which resulted in slow emergence of the faba beans. July was also exceptionally dry (9.6 mm) when compared to the long-term average of 84.6 mm, and hot with 10 days above 30°C. Faba bean yields likely suffered from high heat and low precipitation in July during flowering – pod fill. Faba beans generally prefer wet, cool growing conditions. The first fall frost occurred on October 2 (-0.9˚C) long after the faba beans had been harvested. The complete monthly weather summaries can be downloaded from src.sk.ca/download-weather-summaries.

Table 4. Weather conditions in the 2021 growing season at the Conservation Learning Centre from the onsite SRC weather station.

	May	June	July	August	September	October	Average/Total
				--- Mean Temperature (°C) ---			
2021	10.1	18.3	20.3	17.0	13.5	4.9	14.0
2012-2020	11.4	15.9	18.5	17.1	11.4	2.9	12.9
				--- Precipitation (mm) ---			
2021	29.8	84.0	9.6	57.0	9.5	13.9	202.3
2012-2020	40.4	79.6	84.6	42.9	31.2	20.7	299.4

Soil Sample Results

Spring soil samples were collected using a Dutch soil auger on May 6, 2021 and sent to Agvise Laboratories for analysis to determine fertilizer recommendations. Nitrogen levels were very low with 16 lb/ac in the top 30 cm of soil (Table 5). Phosphorus was low at 6 ppm and potassium was high at 306 ppm. At a soil depth of 0-15 cm, sulphur levels were medium with 18 lb/ac available. Sulphur was high at the 15-30 cm depth with 120+lb/ac present. Organic matter was medium at 4.3%. At a depth of 0-15 cm, soluble salts were low with 0.34 mmho/cm; at 15-30 cm, salt levels were medium with 0.72 mmho/cm.

Table 5. Spring 2021 composite soil test results.

Depth (cm)	N (lb/ac)	P (ppm)	K (ppm)	S (lb/ac)	OM (%)	pH	Salts (mmho/cm)
0 to 15	11	6	306	18	4.3	6.3	0.34
15 to 30	5			120		7.3	0.72
0 to 30	16						

Fall soil samples were collected from each treatment using a Dutch soil auger on September 17, 2021 and sent to Agvise Laboratories for analysis, in order to compare nutrient addition or withdrawal between the different treatments (Table 6). In retrospect, spring soil samples should have been collected per treatment as it is difficult to discern if any differences are due to inoculant or natural soil variability. Available N was higher at the end of the growing season. Faba beans are high N fixers and also high N users (Saskatchewan Pulse Growers, n.d.). Soil tests indicate the crop did not deplete N; however, higher N may be present due to evaporation from hot and dry conditions bringing the mobile nutrient to the surface. Dry conditions also limited faba yields and N demand of the plant. Phosphorus was slightly higher in the peat inoculant treatments and sulphur was highest in the liquid and granular inoculant treatments. However, it is difficult to say if this is due to differences in the inoculant products or natural variability in the soil.

Table 6. Fall 2021 soil test results by treatment.

#	Treatment	Depth (cm)	N (lb/ac)	P (ppm)	K (ppm)	S (lb/ac)
1	Control	0-15	17	5	285	20
		15-30	11			28
2	BASF Nodulator FB Peat	0-15	11	8	248	10
		15-30	9			20
3	AGTIV Peat Rhizo Powder	0-15	14	7	278	12
		15-30	12			26
4	Verdesian Primo Pulse Liquid	0-15	17	4	241	30
		15-30	14			90
5	XiteBio PulseRhizo Liquid	0-15	15	3	231	48
		15-30	11			110
6	TagTeam BioniQ Granular	0-15	11	3	267	120+
		15-30	9			120+
7	AGTIV Pulses Granular	0-15	13	3	237	66
		15-30	8			120+

Feed Quality Analysis

There were no major differences in protein or nutrition between inoculant treatments, but overall, feed quality was lower than is generally expected for faba beans (Table 7). Lower protein and nutrients in the faba beans can likely be attributed to difficult growing conditions. Crude protein averaged around 26.46%, whereas generally it is expected to be between 30-35% (Ontario Ministry of Agriculture, Food and Rural Affairs; 2021). Sodium levels were normal but calcium, phosphorus, potassium and magnesium were between 1.5-4 times lower than anticipated (Ontario Ministry of Agriculture, Food and Rural Affairs; 2021).

Table 7. Feed quality analysis results of faba beans by treatment from SGS Canada Inc.

#	Treatment	Moisture (%)	Crude Protein {N x 6.25} (%)	Ca (%)	P (%)	K (%)	Mg (%)	Na (%)
1	Control	12.64	26.60	0.08	0.32	0.94	0.13	0.03
2	BASF Nodulator FB Peat	13.20	26.40	0.09	0.30	0.95	0.13	0.03
3	AGTIV Peat Rhizo Powder	12.68	25.80	0.09	0.30	0.97	0.13	0.03
4	Verdesian Primo Pulse Liquid	12.82	26.60	0.08	0.31	0.92	0.13	0.03
5	XiteBio PulseRhizo Liquid	12.91	26.20	0.08	0.30	0.95	0.13	0.04
6	TagTeam BioniQ Granular	12.63	27.00	0.10	0.31	0.94	0.13	0.03
7	AGTIV Pulses Granular	12.79	26.60	0.09	0.30	0.96	0.13	0.03
	Mean	12.81	26.46	0.09	0.31	0.95	0.13	0.03
	Standard Deviation	0.20	0.38	0.01	0.01	0.02	0.00	<0.01

Data Analysis

Spring plant density was close to the target 45 plants/m^2, averaging between 39-48 plants/m^2 (Table 8, p>0.05). However, due to hot and dry conditions and chocolate spot pressure, plant stands were likely lower by the end of the growing season. Photos in the appendix show how badly the disease pressure was in the demonstration.

Due to difficult growing conditions, plants were relatively short at maturity, averaging around 52 cm tall (Table 8, p>0.05). Faba beans typically reach 1-1.5 m tall in optimal growing conditions (Saskatchewan Pulse Growers, n.d.).

Plants were vigorous when assessed at early flowering (Table 8, p>0.05). However, nodulation score was under 11 for several treatments, which is considered the threshold for effective nodulation (Table 8, p>0.05). Nodulation was likely impacted by dry soil conditions in early spring. Nodulation score was similar in the control treatment to the inoculated treatments, which suggests the presence of a large population of native rhizobia in the soil. Granular inoculant is generally thought to be less prone to desiccation under hot and dry conditions than liquid or peat inoculant (Barker, 2019). The similarity in nodulation scores for all inoculant products tested could indicate that this difference in desiccation may not be very significant, or perhaps that native soil rhizobia populations were so high that differences in performance of the inoculant products were not distinguishable.

Thousand kernel weight (TKW) of the faba beans varied between 415.7-458.5 g/1000 grains, within the normal range for the crop (Table 8; p>0.05; Saskatchewan Pulse Growers, n.d.). Test weight averaged around 363 g/0.5 L and was lowest in the control at 358.9 g/0.5 L (Table 8, p>0.05).

Overall, yields averaged 2600 lb/ac, well below the target of 3900 lb/ac (Table 8). Faba bean yields were very low across Saskatchewan in 2021, averaging at 985.6 lb/ac according to the Specialty Crop Report (Government of Saskatchewan, 2021). Inoculating the faba beans provided between a 38.3-425.3 lb/ac yield benefit over the un-inoculated control treatment, which suggests there could be a potential benefit to using inoculants in the north-central region of the province (p>0.05).

Table 8. Summary of means in Faba Bean Inoculant Demonstration. N.B.: Due to intense, uneven chocolate spot pressure in replicate 2, data from replicate 2 was omitted when performing this analysis. This same table can be found in the appendix with replicate 2 included, as well as pictures of the disease pressure in that replicate.

#	Treatment	Mean Plant Density	Mean Height	Mean Vigour	Mean Nodulation Score	Mean TKW	Mean Test Weight	Mean Yield
		# plants/m^2	cm	1-5	1-13	g/1000 grains	g/0.5L	lb/ac
1	Control	39	52.3	4.9	10.8	428.9	358.9	2448.6
2	BASF Nodulator FB Peat	48	55.6	4.5	11.3	416.5	362.8	2873.1
3	AGTIV Peat Rhizo Powder	43	49.2	4.8	10.2	454.8	363.9	2486.9
4	Verdesian Primo Pulse Liquid	47	52.3	4.9	10.7	458.5	361.4	2681.6
5	XiteBio PulseRhizo Liquid	47	50.7	4.9	11.2	415.7	363.7	2489.0
6	TagTeam BioniQ Granular	39	53.5	4.8	10.7	425.0	361.7	2873.9
7	AGTIV Pulses Granular	44	51.5	5.0	11.2	417.5	365.5	2670.4
	p value	0.6762	0.1954	0.2762	0.8338	0.7349	0.3139	0.8029

Using inoculant increased total expenses by between $7.88-$16.00/ac (Table 9). The granular and liquid inoculants were similar in price, with the granular being slightly more expensive. The peat-based inoculants were the most inexpensive. Net revenue was higher in nearly all inoculant treatments than in the control. The highest earning treatments, BASF Nodulator FB Peat and Tag Team BioniQ granular, provided a $46.10/ac and $39.29/ac revenue advantage, respectively, over the control. AGTIV Peat Rhizo Powder for pulses and XiteBio PulseRhizo liquid had very similar but slightly lower net revenues compared to the control. Overall, yields were lower than average for the region, so net revenue is expected to be higher under typical growing conditions.

Table 9. Economic analysis for Faba Bean Inoculant Demonstration. Expenses for this trial include the cost of seed, fertilizer, inoculant and pesticides. Net revenue is provided as an estimate and is only meant to be used to help discern differences in revenue potential between treatments. N.B.: Due to intense, uneven chocolate spot pressure in replicate 2, data from replicate 2 was omitted when performing this analysis. This same table can be found in the appendix with replicate 2 included, as well as pictures of the disease pressure in that replicate.

#	Treatment	Mean Yield (lb/ac)	Gross Revenue[1] ($/ac)	Total Expenses[2] ($/ac)	Net Revenue[3] ($/ac)
1	Control	2448.6	318.32	195.77	122.55
2	BASF Nodulator FB Peat	2873.1	373.50	204.86	168.64
3	AGTIV Peat Rhizo Powder	2486.9	323.30	203.65	119.65
4	Verdesian Primo Pulse Liquid	2681.6	348.61	211.17	137.44
5	XiteBio PulseRhizo Liquid	2489.0	323.57	210.16	113.41
6	TagTeam BioniQ Granular	2873.9	373.61	211.77	161.84
7	AGTIV Pulses Granular	2670.4	347.15	211.77	135.38

[1]Based on an estimated faba bean market price of $0.13/lb ($285/tonne) from https://www.scic.ca/crop-insurance/prices on February 9, 2022.

[2]Expenses include seed, inoculant, fertilizer, and pesticide. MAP prices were obtained from Lake Country Co-op Agro, putting MAP at $1015/tonne. Inoculant prices correspond to the suggested retail price (SRP) obtained from the product distributors. Other costs estimated from the 2021 Crop Planning Guide include faba bean seed ($42.23/ac), herbicide ($58.54/ac), insecticide ($20.84/ac), and fungicide ($28.13/ac). Additional expenses to consider are machinery wear and fuel, labour, property taxes, etc.

[3]Yields were below target due to difficult growing conditions. As a result, net revenue is lower than what would be anticipated under more typical growing conditions.

References:

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11. Conclusions and Recommendations

Nodulation score was similar in the un-inoculated control and in the inoculated treatments, which suggests a large population of indigenous soil rhizobia were present. However, despite the presence of native rhizobia in the soil, there did appear to be some small yield and revenue benefits to the use of inoculants with faba beans. There were no major differences observed between inoculant types or products. It is recommended that producers in the Prince Albert region of the province still use inoculants when growing faba beans, but they can feel comfortable choosing the formulation that is the most convenient for them to use and that makes the most economic sense for their operations. It may be beneficial to repeat this study in a cooler, wetter year, to see how different inoculant products perform under more ideal growing conditions for faba beans.

This demonstration was featured at the 2021 Annual Field Day and toured during the CLC AGM. It was visited in person by approximately 36 people and will be featured in upcoming research updates and fact sheets. A virtual field day video featuring this trial was posted to the CLC’s YouTube channel and has 90 views to date.

Supporting Information

12. Acknowledgements

The Conservation Learning Centre graciously acknowledged the Ministry’s support through signage directly in field with the project, verbally during the Field Day and on the Field Day agenda handed out to all visitors. The CLC also thanks Nutrien Ag Solutions for donations of crop inputs, and sales representatives from Taurus Ag Marketing Inc., Verdesian Life Sciences, XiteBio and Novozymes/Univar Solutions for donating some of the inoculant used in the trial.

13. Appendix

Table A.1. Summary of means in Faba Bean Inoculant Demonstration with replicate 2 included.

#	Treatment	Mean Plant Density	Mean Height	Mean Vigour	Mean Nodulation Score	Mean TKW	Mean Test Weight	Mean Yield
		# plants/m^2	cm	1-5	1-13	g/1000 grains	g/0.5L	lb/ac
1	Control	38	51.9	4.7	10.3	427.7	358.7	2190.2
2	BASF Nodulator FB Peat	46	54.5	4.7	11.1	434.9	362.0	2517.0
3	AGTIV Peat Rhizo Powder for pulses	43	48.8	4.8	10.2	454.8	363.2	2284.5
4	Verdesian Primo Pulse Liquid	44	51.3	4.7	10.2	353.8	361.2	2435.5
5	XiteBio PulseRhizo Liquid	47	51.9	4.9	11.2	415.7	362.8	2448.6
6	TagTeam BioniQ Granular	41	52.5	4.7	10.5	410.6	362.2	2550.4
7	AGTIV Pulses Granular	46	51.3	4.8	10.7	414.1	363.2	2604.1
	p value	0.6419	0.2491	0.8140	0.8251	0.8042	0.5495	0.8066

Table A.2. Economic analysis for Faba Bean Inoculant Demonstration with replicate 2 included.

#	Inoculant	Mean Yield (lb/ac)	Gross Revenue ($/ac)	Total Expenses ($/ac)	Net Revenue ($/ac)
1	None - Check	2190.2	284.73	195.77	88.96
2	BASF Nodulator FB Peat	2517.0	327.21	204.86	122.35
3	AGTIV Peat Rhizo Powder	2284.5	296.99	203.65	93.34
4	Verdesian Primo Pulse Liquid	2435.5	316.62	211.17	105.45
5	XiteBio PulseRhizo Liquid	2448.6	318.32	210.16	108.16
6	TagTeam BioniQ Granular	2550.4	331.55	211.77	119.78
7	AGTIV Pulses Granular	2604.1	338.53	211.77	126.76

Image A.1. Replicate 2 of the Faba Bean Inoculant Demonstration on July 29, 2021. This photo demonstrates how the centres of the plots in replicate 2 exhibited severe stand losses due to chocolate spot pressure.

Image A.2. Replicate 2 of the Faba Bean Inoculant Demonstration on July 29, 2021. This photo demonstrates how uneven the disease pressure is across replicate 2. The plots on the left and right sides of the picture show minimal disease pressure, whereas the centres of the middle plots have experienced serious stand losses. Replicate 1 can be seen in the back of the picture and is virtually unaffected by the chocolate spot

Abstract

14. Abstract/Summary

This trial aimed to demonstrate various inoculant options for faba bean producers and to provide insights into the costs and benefits of different inoculant types. Snowbird faba beans were seeded on May 11, 2021 at the Conservation Learning Centre located 18 km south of Prince Albert, SK. The faba beans were harvested on September 14, 2021. There were 7 treatments including 1 un-inoculated control and 6 inoculant products, consisting of 2 products each of peat, liquid and granular inoculants. Peat and liquid products were applied on-seed prior to seeding and granular was applied in-furrow at seeding. The 2021 growing season was unusually hot and dry, which negatively impacted faba bean performance. Yields were low overall, averaging around 2600 lb/ac, well below the target of 3900 lb/ac. Nodulation score was similar in the control and inoculated treatments, suggesting a large population of native rhizobia already present in the soil. Despite the presence of native soil rhizobia, the inoculant treatments exhibited between a 38.3-425.3 lb/ac yield benefit over the control. An economic analysis also indicated that there may be revenue benefits to using inoculants in faba beans. There were no major differences observed between inoculant types or products. It is recommended that producers in the north-central region of the province continue to use inoculants when growing faba beans, but that they focus on choosing a product that is most convenient for them to use and that makes the most economic sense for their operations. It may be beneficial to repeat this demonstration in a cooler, wetter year, to see how different inoculants compare under more ideal growing conditions for faba beans. This demonstration was featured at the 2021 Annual Field Day and toured during the CLC AGM. It was visited in person by approximately 36 people and will be featured in upcoming research updates and fact sheets. A virtual field day video featuring this trial was posted to the CLC's YouTube channel and has 90 views to date.