2019 Research Report

from the

East Central Research Foundation

Project Title: Can Farmer Saved Seed Wheat Perform as well as Certified Seed in Saskatchewan?

(SWDC #181106-101)

Principal Investigators:

Mike Hall[1], Heather Sorestad[1] Robin Lokken[2], Christiane Catellier[3], Jessica Pratchler[4], Lana Shaw[5] Garry Hnatowich[6], Jessica Weber[7], and Bryan Nybo[8]

[1]East Central Research Foundation, Yorkton, SK.
[2]Conservation Learning Centre, Prince Albert, SK
[3]Indian Head Research Foundation, Indian Head, SK.
[4]Northeast Agriculture Research Foundation, Melfort, SK
[5]South East Research Farm, Redvers, SK
[6]Irrigation Crop Diversification Centre, Outlook, SK
[7]Western Applied Research Corporation, Scott, SK
[8]Wheatland Conservation Area Inc., Swift Current, SK

Project Identification

1. **Project Number:** SWDC #181106-101
2. **Producer Group Sponsoring the Project:** Saskatchewan Wheat Development Commission
3. **Project Location(s):** Yorkton SK
4. **Project start and end dates (month & year):** April 2019 to April 2020
5. **Project contact person & contact details:**

Mike Hall, Research Coordinator

East Central Research Foundation/Parkland College
Box 1939, Yorkton, SK, S3N 3X3
Phone: 306-621-6032
Email: m.hall@parklandcollege.sk.ca

Objectives and Rationale

6. **Project objectives:**
    - To compare the vigor and yield performance of various lots of farmer-saved wheat seed relative to the same varieties of certified seed.
    - To determine the degree to which seed treatment can improve the vigor and yield potential of farmer saved and certified seedlots of wheat.

7. **Project Rationale:**

While the yield loss from growing saved seed from hybrid crops such as canola[1] has been well documented, little research has compared yields between certified and farmer-saved seed (FSS) for wheat in western Canada. Producers of cereal grains are free to retain seed for planting on their own farm. This retained seed is commonly referred to as "farmer-saved seed". Despite the guaranteed quality of certified seed, a phone survey of 800 producers in 2004 determined approximately 70 to 80% of cereal acres in western Canada were seeded with farmer-saved seed[2]. Producers cited "reduced costs" and "knowing what is in the seed" as reasons preferring FSS. Farmer-saved seed is typically a cheaper seed source than certified seed. A 13-year study in Alberta between 2003 and 2016 found the average price premium for certified wheat seed over FSS was $3.75/bu[3], even when assuming a 1.5 bu/ac yield benefit from using a new variety of certified seed. To be fair, the Canadian Seed Growers' Association does not mention higher yields when discussing "the certified advantage".[4] Certified seed is valuable because it is "true to type" meaning it has retained all the genetic benefits developed by the breeder. This helps with "quality assurance" for the end users which is of increasing importance as the industry moves toward a value chain model. In addition, to be "certified", seed must meet high standards of germination and freedom from impurities, which are determined by an officially recognized third-party agency[5]. Finally, it is important to support a system that ensures the development of new varieties to keep Canadian wheat producers globally competitive. The exact form of this

support is currently under debate.

Many producers believe they are capable of producing quality FSS which is comparable to certified seed. Producers will typically grow FSS for 2-3 years and then purchase certified seed to introduce better genetics to the farm. This may prove to be true for many producers in Saskatchewan as past study with winter wheat in central Oklahoma found FSS could often perform as well as certified seed. However, the relative comparison changed between years in their study. In 2003, they observed 9 out of 19 farmer-saved seedlots were inferior for grain production compared to the best certified seed source. In contrast, only 2 out of 27 farmer-saved samples were inferior in 2004 and only 4 out of 17 were inferior in 2005.[6] The authors concluded "that if farmers use quality control measures similar to those required for certified seed, farmer-saved wheat seed can produce forage and grain yield comparable to that of certified seed" [6]. To ensure quality seed is being planted, seed must be sent away for testing.

There are a number of seed labs, which offer vigor testing and disease screenings to help producers determine the suitability of a seedlot for seeding. Vigor tests are superior to the standard germination test as they will give a better indication of crop emergence and vigor under adverse conditions. A fungal screen can determine the presence of a number of seedborne pathogens that can also affect the vigor of a seedlot. Low vigor seedlots with high fungal screens can be retested to determine if seed treatment can improve vigor[7]. Seed treatment will often improve the vigor of a seedlot by 10%. However, the level of seedborne disease may be such that locating a better seedlot would be advisable.

The quality of farmer-saved seedlots are likely to be more variable in quality than certified seed which must meet exacting standards. The intent of this proposal is to randomly compare the vigor and yield potential of FSS relative to certified seed in Saskatchewan over the next 3 years. The intent is to sample as many seedlots as possible. In the first year of this study, 24 different seedlots of FSS were compared against the same varieties of 24 different seedlots of certified seed.

[1]Clayton, G.W., Brandt, S., Johnson, E.N., O'Donovan, J.T., Harker, K.N., Blackshaw, R.E., Smith, E.G., Kutcher, H.R., Vera, C., and M. Hartman. 2009. Comparison of Certified and Farm-Saved Seed on Yield and Quality Characteristics of Canola. Agron. J. 101: 1581-1588

[2]https://www.cropweek.com/presentations/2005/ssga.pdf

[3]Overview of Certified Seed and Farmer Saved Seed, March 2018. Economics and Competitiveness Branch. Alberta Government.
https://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/econ15976/$FILE/Overview%20of%20Certified%20Seed%20and%20Farmer%20Saved%20Seed%20II.pdf

[4]The Certified Advantage
https://seedgrowers.ca/farmers/the-certified-advantage/

[5]What is Canadian Certified Seed?
http://seedgrowers.ca/seed-growers/what-is-canadian-certified-seed/

[6]Edwards, J.T. and E. G. Krenzer Jr. 2006. Quality of Farmer-Saved Wheat Seed is Variable in the Southern Great Plains. Online. Crop Management doi:10.1094/CM-2006-0531-01-RS

[7]What is a Fungal ScreenTM for Cereals? 20/20 Seed Labs https://www.2020seedlabs.ca/what-is-a-fungal-screen-for-cereals/

Methodology and Results

8. Methodology:

The trial was setup as a 2 by 3 by 2 level factorial in a randomized complete block design with 4 replicates. Plot size, row spacing, and fertilizer application techniques at seeding varied between locations depending on equipment. Treatments are listed in Table 1 below. The targeted seeding rate and date were 300 seeds/m^2 and the first three weeks in May, respectively. The ideal seeding depth target was 1 inch. Seed treatment was applied shortly before seeding. Seed treatments varied between location and the exact product used can be found in Table 2 along with dates of operation. Nitrogen, phosphorus, potassium and sulphur were applied at each location as required by soil test.

Table 1. Treatment list for 2019 "Can Farmer Saved Seed Wheat (Triticum aestivum L.) perform as well as Certified Seed in Saskatchewan?" Trial

Trt #	Seed treatment	Variety pairing	Seed type
1	Untreated	A	Certified
2	Untreated	A	Farmer-Saved Seed
3	Untreated	B	Certified
4	Untreated	B	Farmer-Saved Seed
5	Untreated	C	Certified
6	Untreated	C	Farmer-Saved Seed
7	Treated	A	Certified
8	Treated	A	Farmer-Saved Seed
9	Treated	B	Certified
10	Treated	B	Farmer-Saved Seed
11	Treated	C	Certified
12	Treated	C	Farmer-Saved Seed

Table 2. Dates of operations in 2019 for the "Can Farmer Saved Seed Wheat Perform as well as Certified Seed in Saskatchewan" trial								
Activity	**----------Date----------**							
	Indian Head	**Melfort**	**Outlook**	**Prince Albert**	**Redvers**	**Scott**	**Swift Current**	**Yorkton**
Pre-seed Herbicide Application	May 12 Glyphosate	May 24 Glyphosate (540 0.5L/ac) + Heat LQ (21mL/ac) + Merge (400mL/ac)	N/A	N/A	N/A	May 19 Glyphosate 540 (1L/ac) + AIM (35 ml/ac)	May 13 RT540 (0.67 L/ac)	N/A
Seeding & Seed treatment applied	May 7 & Raxil PRO	May 23 & Cruiser Vibrance Quattro (325mL/ 100kg seed)	May 14 & Cruiser Vibrance Quatro (325 ml/100 kg seed)	May 23 & Raxil PRO (325mL/100 kg seed)	May 6 & Raxil PRO	May 14 & CruiserMax x Cereal	May 16 & Cruiser Vibrance Quattro (325 ml/100kg seed)	May 7 and 8 & CruiserMax x Vibrance
Emergence Counts	June 4	June 21	June 14	June 12	June 5	June 5	June 7	May 30
Vigour Rating	June 4	July 12	June 20	July 11	N/A	June 27		June 12 and June19
In-crop Herbicide Application	June 17 OcTTain + Simplicity	June 27th Axial (0.5L/ac) July 4 Prestige XC (A@ 0.13L/ac &	June 10 Badge II & Simplicity 21 gm/ac	June 27 Stellar A (florasulam 2.5g/L, fluroxypyr 100 g/L) @ 1L/ha) + B	June 10 Buctril M + Clodinafop	June 26 Axial (0.5L/ac) + Buctril M (0.4L/ac) @ 10gpa	June 12 Varro (200ml/ac) + Octane (450ml/ac)	June 12 Prestige, June 25 MCPA, July 3 MCPA

		B@ 0.6L/ac)		(MCPA 600 g/L) @ 900 mL/ha			+ Agral90 (0.25 l/ac)	
In-crop Fungicide Application	July 9 Prosaro	N/A	July 15 Caramba (400 mL/ac)	N/A	July 12 Caramba	N/A	N/A	July 3 Acapela (200ml/ac)
Lodging Rating	N/A	Oct 9	N/A	N/A	N/A	Aug 26	Aug 20	Sept 3
Desiccant	Aug 28 Glyphosate	N/A	N/A	Sept 5 Glyphosate (1.67L/ha)	N/A	Sept 6 Heat LQ (41.8 mL/ac) + Roundup 540 (0.67L/ac) + Merge (0.2L/ac) @10gpa	N/A	Sept 3 Roundup Transorb (0.66 L/ac)
Harvest	Sept 6	Oct 9	Sept 24	Oct 1	Aug 29	Sept 16	Aug 27	Sept 16

9. Results:

Growing Season Weather

Mean monthly temperatures and precipitation amounts with long term (1981-2010) averages for 8 sites are listed in Table 3 and 4. The 2019 season was cooler than the long-term average at all sites. Rainfall was below average for all sites except Scott and Swift Current. Irrigation applied to the Outlook site included 15.2mm in May, 66.0mm in June, 121.9mm in July and 30.5 mm in August. Soil test results for each site are found in Table 5.

Table 3. Mean monthly temperatures amounts along with long-term (1981-2010) normals for the 2019 growing seasons at 8 sites in Saskatchewan.

Location	Year	May	June	July	August	Avg. / Total
		----------*Mean Temperature (°C)* ----------				
Indian Head	2019	8.9	15.7	17.4	15.8	14.4
	Long-term	***10.8***	***15.8***	***18.2***	***17.4***	***15.6***
Melfort	2019	8.8	15.3	16.9	14.9	14.0
	Long-term	***10.7***	***15.9***	***17.5***	***16.8***	***15.2***
Outlook	2019	9.9	16.0	18.0	16.2	15.0
	Long-term	***11.5***	***16.1***	***18.9***	***18.0***	***16.1***
Prince Albert	2019	9.5	15.8	17.4	15.1	14.5
	Long-term	***10.4***	***15.3***	***18.0***	***16.7***	***15.1***
Redvers	2019	9.5	16.3	18.5	16.6	15.2
	Long-term	***12***	***16***	***19***	***18***	***16.3***
Scott	2019	9.1	14.9	16.1	14.4	13.6
	Long-term	***10.8***	***14.8***	***17.3***	***16.3***	***14.8***
Swift Current	2019	*9.5*	*15.8*	*17.7*	*16.8*	*15.0*
	Long-term	***11***	***15.7***	***18.4***	***17.9***	***15.8***
Yorkton	2019	8.6	16	18.3	16.1	14.8
	Long-term	***10.4***	***15.5***	***17.9***	***17.1***	***15.2***

Table 4. Precipitation amounts along with long-term (1981-2010) normals for the 2019 growing seasons at 8 sites in Saskatchewan.

Location	Year	May	June	July	August	Avg. / Total
		---------- *Precipitation (mm)* ----------				
Indian Head	2019	13.3	50.4	53.1	96.0	212.8
	Long-term	***49***	***77.4***	***63.8***	***51.2***	***241.4***
Melfort	2019	18.8	87.4	72.7	30.7	209.6
	Long-term	***42.9***	***54.3***	***76.7***	***52.4***	***226.3***
Outlook	2019	13.2	90.2	43.8	39.6	186.8
	Long-term	***42.6***	***63.9***	***56.1***	***42.8***	***205.4***
Prince Albert	2019	30.0	54.4	57.4	16.8	158.6
	Long-term	***44.7***	***68.6***	***76.6***	***61.6***	***251.5***
Redvers	2019	18.3	59.7	34.0	85.1	197.1
	Long-term	***60***	***91***	***78***	***64***	***293***
Scott	2019	12.7	97.7	107.8	18	236.2
	Long -term	***38.9***	***69.7***	***69.4***	***48.7***	***226.7***
Swift Current	2019	13.3	156	11.1	42.6	223
	Long-term	***42.1***	***66.1***	***44***	***35.4***	***187.6***
Yorkton	2019	11.1	81.6	49.1	32.2	174
	Long-term	***51***	***80***	***78***	***62***	***272***

Table 5. Soil Test Nitrate Levels for each location.								
Nitrate Levels (lbs NO_3-N/ac)	**Indian Head**	**Melfort**	**Outlook**	**Prince Albert**	**Redvers**	**Scott**	**Swift Current**	**Yorkton**
0-15cm (0-6in)	16 lb/ac	9 lb/ac	8 lb/ac	17 lb/ac	29 lb/ac	14 lb/ac	28 lb/ac	14 lb/ac
15-30cm (6-12in)		10 lb/ac		12 lb/ac				
15-60cm (6-24in)	39 lb/ac		10 lb/ac		42 lb/ac	18 lb/ac	225 lb/ac	18 lb/ac
Total 0-60cm (0-24in)	55 lb/ac		18 lb/ac		71 lb/ac	32 lb/ac	253 lb/ac	32 lb/ac
Total 0-30 cm (0-12in)		19 lb/ac		29 lb/ac				

Seeding rates were adjusted for each seedlot based on 1000 kernel weight and vigor to achieve 300 live seeds/m^2 at each location. However, this resulted in very different emergence rates based on plant counts. Crop emergence at Indian Head, Melfort, Outlook, Redvers, Scott, Swift Current and Yorkton averagd 355, 180, 204, 234, 229, 191, 277 plants/m^2, respectively. Soil moisture was quite low early in the season at Prince Albert resulting in poor crop emergence rates of only 82 plants/m^2. Wheat yield was quite high at Yorkton averaging 6081 kg/ha (90 bu/ac). In contrast, yield was very low at Swift Current averaging only 2128 kg/ha (32 bu/ac). The rest of the sites yielded well, even Prince Albert where crop emergence was low. Average yields were 3931, 5470, 4296, 3796, 4395 and 4794 kg/ha at Indian Head, Melfort, Outlook, Prince Albert, Redvers and Scott, respectively. Not surprisingly, average grain protein was very high at Swift Current (19.9%) were yield was very low. Protein was also relatively high at Indian Head (15%). Protein for the remaining sites ranged within 12 to 14%.

The seed treatment used varied between locations (Table 2). Raxil PRO was used at Indian Head, Prince Albert and Redvers. Cruiser Vibrance Quattro was used at Melfort, Outlook and Swift Current. CruiserMaxx Vibrance was used at Yorkton and CruiserMaxx Cereals was use at Scott. In most cases, seed treatment did not significantly affect emergence, plant vigor, wheat yield or grain protein. However, there were a few instances where seed treatments had significant effects. Seed treatment proved to have beneficial effects at Swift Current, where emergence (Tables 6 and 7) and plant vigor based on visual assessments (Tables 9 and 10) were significantly increased. While the use of seed treatment did not significantly affect yield (Tables 12 and 13) at Swift Current, it did significantly increase grain protein (Tables 15 and 16). Why protein increased is not clear. In contrast, some negative effects of seed treatment were observed at Redvers, Yorkton and Indian Head. Seed treatment significantly reduced emergence from 243 to 225 plants/m^2 at Redvers (Table 7) and significantly reduced yield at Yorkton by 3.2% (Table 13). At Indian Head, there was a significant interaction and seed treatment only significantly reduced the yield of the farmer saved seed for the C variety comparison (Table 14). Otherwise, seed treatment did not significantly affect yield in all other cases. In the absence of disease pressure or conditions conducive to disease development, the author has seen detrimental effects

of seed treatment can occur, particularly if product is not applied evenly to seed. Seed treatment is typically applied at research farms in small batches using a cement mixer at most locations. Every effort is made to apply the seed treatment evenly to seed but the result is not likely as uniform as what a G40 seed treater can accomplish.

Varietal comparisons used to compare differences between FSS and certified seed differed between locations based on grower preference near that location. AAC Brandon is a very popular hard red spring (HRS) variety and was used in 13 of the 24 varietal comparisons. It was present at all locations except Swift Current where durum varieties Transcend, AAC Spitfire and CDC Fortitude were used for the varietal comparisons. Transcend was also used at Redvers. AAC Elie is a fairly popular HRS variety and was present at 4 locations. Cardale was present at 2 locations and Stettler was only compared at one. A complete list of the varietal comparisons along with seed quality results are found in Table 18. In order to be as representative of the market as possible, each varietal comparison between certified and FSS used a different seedlot. A seedlot for a variety at one location was never used again for a comparison at another site. In other words, 24 different seedlots of FSS (8 locations by 3 varietal comparisons) were compared against 24 different seedlots of certified seed (8 locations by 3 varietal comparisons). Each varietal comparison between FSS and certified seed used the same variety.

Determining differences between varietal comparisons was not an objective of this study and the few significant differences that were detected are not of any interest and will not be discussed. Moreover, varietal comparisons are all different at each location and looking at this information averaged over location would not be meaningful. The relative performance of certified seed against FSS is the main comparison of interest and will be discussed at length.

Large differences in emergence rates between FSS and certified seedlots were not expected, as seeding rates were adjusted for each seedlot based on 1000 kernel weight and vigor to achieve 300 live seeds/m^2 at each location. Averaged across location, this resulted in comparable emergence rates of 223 and 215 plants/m^2 for FSS and certified seedlots, respectively. However, emergence did vary greatly between sites (Table 7). As noted earlier, overall emergence rates were quite low at Prince Albert. Emergence rates between FSS and certified seedlots did not statistically differ at Yorkton, Prince Albert and Melfort. For the remaining sites there was an interaction between varietal comparisons and seed type. In other words, there were some significant differences in emergence between FSS and certified seed for some of the varietal comparisons, however, the magnitude of these differences were not of agronomic significance. Any differences in emergence are not necessarily related to differences in seedlot vigor as differences in seeding rates could also be a factor. In other words, differences in emergence between seed types should not be considered an indication of seedlot vigor. Overall, emergence between FSS and certified seed were comparable.

Based on visual ratings, seedling emergence from certified seed appeared more vigorous at Yorkton (Table 10). While the vigor difference was statistically significant it was only minor and did not result in any detectable yield or protein differences later on. At Indian Head there was a significant interaction. While certified seed appeared more vigorous for one of AAC Brandon varietal comparisons, FSS appeared more vigorous for the AAC Elie varietal comparison. Again,

treatments which appeared more vigorous did not translate into improved yield or protein differences. Overall, there were few differences in observed seedling vigor between certified and FSS and none of the difference that were observed resulted in greater yields.

In the majority of cases, yield and grain protein did not significantly differ between certified and FSS seedlots (Tables 12, 13, 15 and 16). When averaged across location, certified seed yielded 4362 kg/ha (64.9 bu/ac) with a grain protein of 14.20%. FSS was virtually identical, averaging 4361 kg/ha (64.9 bu/ac) with a grain protein of 14.25%. There were a few instances where yield did vary between certified and FSS seedlots. At Indian Head, certified AAC Elie (C-varietal comparison) was significantly lower yielding by 7%, but only for the untreated seed comparison (Table 14). At Scott, averaged over seed treatment, certified AAC Elie (B-varietal comparison) significantly yielded 9% more grain with 1% higher protein (13.04% vs 12.0%) compared to FSS. Certified AAC Elie may have performed better as it had a higher vigor germination test result of 97% compared to 92% for the FSS (Table 18). Moreover, the emergence for the certified AAC Elie was in a more ideal range averaging 279 plants/m^2 compared to only 200 plants/m^2 for FSS. These differences may have contributed to the better performance of the certified AAC Elie in this instance. At Outlook, there was an interaction involving the protein data. The grain protein of the certified AAC Brandon was almost significantly lower than the grain protein of the FSS (12.58% vs 13.18%) for A-varietal comparison. In contrast, the opposite result occurred for the B-varietal comparison where certified AAC Brandon produced significantly higher grain protein compared to FSS (13.2% vs 11.34%). Though not statistically significant, the differences in grain protein were a reflection of yield differences. When certified AAC Brandon had higher grain protein than FSS it also had lower yield and visa versa. The difference in performance between certified AAC Brandon and FSS AAC Brandon varietal comparisons (A and B varietal comparison- Outlook) cannot be explained in terms of seed quality. The vigor and fungal screens were all good and essentially the same between the four seedlots. Overall, at the 8 locations, yield and protein did not frequently differ between certified and FSS seedlots. This is not surprising as the quality of seed in terms of germination, vigor and fungal screens were very good for both FSS and Certified seedlots in the vast majority of cases (Table 18).

The average germination for the certified and FSS was 97% and 96.8%, respectively. Percent vigor was also excellent for both and averaged 93.1% for certified and 93.3% for FSS. Overall, germination and vigor were virtually identical between seedlots and did not differ significantly based on a paired T-test. The 5 pathogenic fungi which were screened for on seedlots included:

- *Cochliobolis sativus* – Seedling blight, foot and root rot or spot blotch (leaf blight)
- *Fusarium graminearum* – Head blight
- *Fusarium* spp. – Seedling blight, root and crown rot, and head blight
- *Pyrenophora* spp. – Leaf blight (leaf stripe, net blotch and tan spot), and seedling blight (oats)
- *Septoria* spp. – Leaf blotch

According to the 20/20 Seed Labs Inc. website, seed treatment may not provide sufficient control if infection with any one disease is higher than 8% or if the total disease of 3 or more pathogens is more than 12%. Only one seedlot of FSS used at Prince Albert exceeded this criteria. The rest of the seedlots were in good condition.

On average, the fungal screens found certified and FSS had 1.63 and 2.44% total *Fusarium* species, respectively. This difference did not prove to be statistically significant (paired T test p=0.28). Total % *Fusarium* species did vary more between seedlots of FSS. One seedlot of FSS used at Prince Albert had 18% total *Fusarium* species (Table 15). Despite the high fungal screen for this seedlot, the vigor was still 92% and the performance of this seedlot did not significantly differ from its certified counterpart in terms of either yield or protein. This may not have been the case if the seed had been planted under cold wet conditions. *Fusarium graminearum* (head blight) was detected in 5 seedlots ranging from 0.5 to 1.5%. These levels of *Fusarium graminearum* are not of agronomic significance unless *Fusarium* head blight is already present in stubble. *Cochliobolis sativus* (seedling blight, foot and root rot or spot blotch) was found in 2 seedlots at 0.5% which is also of no agronomic significance. For the most part, seedlots of FSS were mostly of good quality and comparable to certified. Recent years have been relatively dry which is good for producing quality seed. It would be interesting to evaluate seed quality between certified and FSS after a couple of excessively wet seasons.

10. Conclusions and Recommendations

Positive effects of seed treatment on emergence, seedling vigor and grain protein were observed at Swift Current. In contrast, there were a couple instances were yield was significantly reduced by seed treatment at Yorkton and Indian Head. However, seed treatment did not affect emergence, seedling vigor, yield or grain protein of wheat in most cases.

Fungal screening of seedlots found only somewhat higher levels of seedborne disease on FSS. However, there was one seedlot of FSS with total *Fusarium* levels beyond acceptable levels. Despite this, the overall vigor of FSS seedlots were no different from certified seed and few significant differences in emergence, seedling vigor, yield or grain protein were observed between FSS and certified seed. In the few cases where there were significant differences, the observation did not consistently favor the use of either certified or FSS. The results from this study would indicate that producers using FSS that is 1 to 3 years removed from certified were achieving yields and grain protein similar to those using certified seed in 2019. Seed quality was good in 2019 because past environmental conditions were conducive for low levels of seedborne disease. It would be interesting to compare seed quality between certified and FSS after wet years when seed quality in the area is poor. This study will be continued for 2 more years and that comparison may still occur.

Growing FSS was more economical in this study because there was no yield or protein increase compared to growing certified seed and there is usually an added cost to purchasing certified seed. However, there is value in purchasing certified seed, to assure quality (true to type) for end users and to introduce better genetics to the farm to stay competitive. Certified seed should be obtained at a premium as these assurances have value and there is value in supporting a system

where new genetics can be developed to keep Canada globally competitive. Exactly how this support will continue is currently under debate. This study does not conclude that there is no value in purchasing certified seed only that there were no production risks to growing FSS during 2019. Growing FSS for a couple years between purchasing new certified varieties with better genetics may prove to have little risk to production. This would appear to be the approach of many producers as approximately 70 to 80% of cereal acres in western Canada were seeded with FSS in 2004 based on a phone survey of 800 producers. Initial results would indicate that wheat producers who use quality control measures similar to those required for certified seed can produce grain yield and protein comparable to that of certified seed.

The trial was toured at Swift Current on July 9 during WCA directors and staff tour (20 attendees) and on July 30 during Swift Current Crop Club tour (12 attendees). The trial was also promoted on Swift Current's Facebook page and CKSW's weekly program "Walk the Plots" reaching thousands of listeners in southwest Saskatchewan. The trial was toured at Outlook during their July 11 CSIDC Field Day which 200 producers and agronomists attended. Indian Head toured the trial during their Indian Head Crop Management Field Day on July 16 (125 attendees).

Supporting Information

11. Acknowledgements:

This project was funded through Saskatchewan Wheat Development Commission.

12. Appendices

Table 6. Significance of seed treatment, variety, and type effects on wheat emergence at multiple locations in 2019.

	Emergence							
	I.H.	**Melfort**	**Outlook**	**P.A.**	**Redvers**	**Scott**	**S.C.**	**Yorkton**
Effect	---------- p-values [z] ----------							
Seed Treatment (S)	NS	NS	NS	NS	0.014	NS	<0.00001	NS
Variety (V)	NS	NS	0.013	NS	0.075	0.075	0.0034	NS
S x V	NS	NS	NS	NS	0.016	NS	NS	NS
Type (T)	NS	NS	0.010	NS	0.01	0.00065	0.088	NS
S x T	NS	NS	NS	NS	NS	NS	NS	NS
V x T	0.028	NS	NS	NS	0.00087	<0.00001	0.0017	NS
S x V x T	NS	NS	NS	NS	0.063	NS	NS	NS

Table 7. Main effects of seed treatment, variety, and type of seed on wheat emergence at multiple locations in 2019.

Main effect	**Emergence**								
	Indian Head	**Melfort**	**Outlook**	**Prince Albert**	**Redvers**	**Scott**	**Swift Current**	**Yorkton**	**All Sites Average**
Seed Treatment	---------- plants/m^2 ----------								
Untreated	358 a	177 a	212 a	78 a	243 a	232 a	165 b	277 a	218
Treated	352 a	184 a	196 a	85 a	225 b	226 a	217 a	276 a	220
LSD	NS	NS	NS	NS	14.4	NS	14.7	NS	--
Varietal comparison									
A	360 a	173 a	219 a	84 a	242 a	222 a	192 ab	272 a	220
B	351 a	189 a	168 b	81 a	222 a	239 a	206 a	279 a	217
C	355 a	179 a	224 a	80 a	237 a	226 a	174 b	279 a	219
LSD	NS	NS	41.3	NS	NS	NS	18.5	NS	--
Type									
Farmer Saved	349 a	179 a	225 a	90 a	243 a	241 a	185 a	272 a	223
Certified	361 a	181 a	182 b	73 a	224 b	217 b	197 a	281 a	215
LSD	NS	NS	32.8	NS	14.4	13.0	NS	NS	--

Table 8. Main effects of seed treatment, variety, and type of seed on wheat emergence at multiple locations in 2019.

Main effect	**Emergence**								
	Indian Head	**Melfort**	**Outlook**	**Prince Albert**	**Redvers**	**Scott**	**Swift Current**	**Yorkton**	**All Sites Average**
Main Effects	---------- plant/m^2 ----------								
1. Untreated A Certified	349 a	167 a	243 ab	75 a	250 abc	223 cd	174 cde	271 a	219
2. Untreated A Farmer-Saved Seed	379 a	179 a	218 abc	84 a	266 ab	227 cd	148 de	270 a	221
3. Untreated B Certified	369 a	167 a	203 abc	106 a	240 abcd	284 a	180 cd	288 a	230
4. Untreated B Farmer-Saved Seed	348 a	190 a	124 c	54 a	239 abcd	208 cd	170 cde	263 a	200
5. Untreated C Certified	338 a	185 a	273 a	85 a	276 a	209 cd	130 e	273 a	221
6. Untreated C Farmer-Saved Seed	368 a	172 a	212 abc	65 a	186 e	240 bc	186 bcd	298 a	216
7. Treated A Certified	354 a	172 a	211 abc	82 a	227 bcde	227 cd	233 ab	272 a	222
8. Treated A Farmer-Saved Seed	357 a	173 a	206 abc	94 a	225 bcde	212 cd	213 abc	273 a	219
9. Treated B Certified	348 a	198 a	212 abc	88 a	209 cde	274 ab	217 abc	278 a	228
10. Treated B Farmer-Saved Seed	338 a	200 a	134 b	75 a	202 de	191 d	258 a	286 a	211
11. Treated C Certified	335 a	184 a	211 abc	106 a	258 ab	229 cd	174 cde	250 a	218
12. Treated C Farmer-Saved Seed	380 a	175 a	200 abc	67 a	228 bcde	225 cd	208 bc	297 a	223
L.S.D	52.8	NS	108.1	NS	47.4	42.7	48.3	NS	--

Table 9. Significance of seed treatment, variety, and type effects on wheat Vigour at multiple locations in 2019.

	Vigour							
	Indian Head	**Melfort**	**Outlook**	**Prince Albert**	**Redvers**	**Scott**	**Swift Current**	**Yorkton**
Effect	---------- p-values [z] ----------							
Seeding Treatment (S)	NS	NS	NS	NS	NS	NS	0.0006	NS
Variety (V)	NS	NS	0.0011	NS	NS	NS	0.0065	NS
S x V	NS	NS	NS	NS	NS	NS	NS	NS
Type (T)	0.023	NS	NS	NS	NS	NS	NS	0.014
S x T	NS	NS	NS	NS	NS	NS	NS	NS
V x T	0.00001	NS	NS	NS	NS	NS	NS	NS
S x V x T	NS	NS	NS	NS	NS	NS	NS	NS

[z] p-values ≤ 0.05 indicate that a treatment effect was significant and not due to random variability

Table 10. Main effects of seed treatment, variety, and type of seed on wheat yield at multiple locations in 2019.

Main effect	**Vigour**								
	Indian Head	**Melfort**	**Outlook**	**Prince Albert**	**Redvers**	**Scott**	**Swift Current**	**Yorkton**	**All Sites Average**
Seed Treatment	---------- 1-10 ----------								
Untreated	8.4 a	7.9 a	9.1 a	6.3 a	NS	5.9 a	8.5 b	7.3 a	7.7
Treated	8.1 a	7.8 a	9.3 a	7.0 a	NS	6.0 a	9.5 a	7.5 a	7.9
LSD	NS	NS	NS	NS	NS	NS	0.52	NS	--
Varietal comparison									
A	8.1 a	8.0 a	8.5 b	6.4 a	NS	6.2 a	9 a	7.3 a	7.7
B	8.4 a	7.7 a	9.6 a	6.9 a	NS	5.6 a	9.6 a	7.3 a	7.9
C	8.3 a	7.8 a	9.5 a	6.7 a	NS	5.9 a	8.5 b	7.6 a	7.8
LSD	NS	NS	0.64	NS	NS	NS	0.65	NS	--
Type									
Farmer Saved	8.0 a	7.9 a	9.3 a	6.6 a	NS	5.9 a	8.8 a	7.2 b	7.7
Certified	8.5 a	7.8 a	9.2 a	6.7 a	NS	5.9 a	9.2 a	7.5 a	7.8
LSD	0.36	NS	NS	NS	NS	NS	NS	0.23	--

Table 11. Main effects of seed treatment, variety, and type of seed on wheat yield at multiple locations in 2019.									
Main effect	**Vigour**								
	Indian Head	**Melfort**	**Outlook**	**Prince Albert**	**Redvers**	**Scott**	**Swift Current**	**Yorkton**	**All Sites Average**
Main Effects	---------- (1-10) ----------								
1. Untreated A Certified	7.3 cd	7.8 a	8.5 a	5.5 a	Na	6.5 a	8.5 abc	6.9 c	7.3
2. Untreated A Farmer-Saved Seed	9.3 a	8.3 a	8.3 a	5.8 a	Na	6.3 a	8.5 abc	7.1 abc	7.7
3. Untreated B Certified	9.0 a	7.5 a	10.0 a	6.8 a	Na	5.8 a	9.3 ab	7.3 abc	8.0
4. Untreated B Farmer-Saved Seed	8.5 ab	7.8 a	9.3 a	6.9 a	Na	5.5 a	9.5 ab	7.4 abc	7.8
5. Untreated C Certified	8.3 abc	8.5 a	9.5 a	7.0 a	Na	5.5 a	7.3 c	7.3 abc	7.6
6. Untreated C Farmer-Saved Seed	8.3 abc	7.5 a	9.3 a	5.8 a	Na	5.8 a	8.3 bc	7.8 a	7.5
7. Treated A Certified	7.0 d	7.5 a	8.5 a	6.9 a	Na	5.8 a	9.5 ab	7.5 abc	7.5
8. Treated A Farmer-Saved Seed	8.8 ab	8.5 a	8.8 a	7.5 a	Na	6.3 a	9.5 ab	7.6 abc	8.1
9. Treated B Certified	8.3 abc	8.3 a	9.8 a	5.6 a	Na	5.5 a	9.5 ab	7.0 bc	7.7
10. Treated B Farmer-Saved Seed	7.8 bcd	7.3 a	9.5 a	8.4 a	Na	5.8 a	10.0 a	7.6 abc	8.1
11. Treated C Certified	8.5 ab	7.8 a	9.3 a	7.8 a	Na	6.5 a	9.0 ab	7.5 abc	8.1
12. Treated C Farmer-Saved Seed	8.3 abc	7.3 a	10.0 a	6.1 a	Na	6.0 a	9.5 ab	7.7 ab	7.8
L.S.D	1.2	NS	1.7	NS	Na	NS	1.7	0.76	--

Table 12. Significance of seed treatment, variety, and type effects on wheat yield at multiple locations in 2019.

	Yield							
	I.H.	**Melfort**	**Outlook**	**P.A**	**Redvers**	**Scott**	**S.C.**	**Yorkton**
Effect	---------- p-values [z] ----------							
Seeding Treatment (S)	NS	NS	NS	NS	NS	NS	NS	0.011
Variety (V)	Ns	NS	NS	NS	0.0074	<0.00001	NS	NS
S x V	0.0029	NS	NS	NS	NS	NS	NS	NS
Type (T)	NS	NS	NS	NS	NS	NS	NS	NS
S x T	NS	NS	NS	NS	NS	NS	NS	NS
V x T	NS	NS	NS	NS	NS	0.0045	NS	NS
S x V x T	0.0064	NS	NS	NS	NS	NS	NS	NS

[z] p-values ≤ 0.05 indicate that a treatment effect was significant and not due to random variability

Table 13. Main effects of seed treatment, variety, and type of seed on wheat yield at multiple locations in 2019.

Main effect	**Yield**								
	Indian Head	**Melfort**	**Outlook**	**Prince Albert**	**Redvers**	**Scott**	**Swift Current**	**Yorkton**	**All Sites Average**
Seed Treatment	---------- kg/ha ----------								
Untreated	3951 a	5529 a	4286 a	3681 a	4393 a	4799 a	2139 a	6179 a	4370
Treated	3910 a	5412 a	4306 a	3912 a	4397 a	4788 a	2116 a	5982 b	4353
LSD	NS	NS	NS	NS	NS	NS	NS	152	--
Varietal comparison									
A	3942 a	5571 a	4180 a	3841 a	4450 a	5098 a	2147 a	6119 a	4419
B	3889 a	5385 a	4430 a	3728 a	4503 a	4755 b	2187 a	5999 a	4360
C	3961 a	5455 a	4277 a	3821 a	4232 b	4527 c	2048 a	6124 a	4306
LSD	NS	NS	NS	NS	180	157	NS	NS	--
Type									
Farmer Saved	3922 a	5520 a	4344 a	3620 a	4419 a	4843 a	2131 a	6086 a	4361
Certified	3939 a	5420 a	4247 a	3973 a	4371 b	4745 a	2124 a	6076 a	4362
LSD	NS	NS	NS	NS	143	NS	NS	NS	--

Table 14. Main effects of seed treatment, variety, and type of seed on wheat yield at multiple locations in 2019.									
Main effect	**Yield**								
	Indian Head	**Melfort**	**Outlook**	**Prince Albert**	**Redvers**	**Scott**	**Swift Current**	**Yorkton**	**All Sites Average**
Main Effects	---------- kg/ha ----------								
1. Untreated A Certified	3979 ab	5571 a	4485 a	3584 a	4462 a	5253 a	2220 a	6113 ab	4458
2. Untreated A Farmer-Saved Seed	3855 b	5443 a	3864 a	3934 a	4407 a	5155 ab	2179 a	6147 ab	4373
3. Untreated B Certified	3864 b	5550 a	4164 a	3280 a	4627 a	4832 bc	2175 a	6202 ab	4337
4. Untreated B Farmer-Saved Seed	3839 b	5465 a	4593 a	3912 a	4426 a	4558 cd	2261 a	6179 ab	4404
5. Untreated C Certified	3930 b	5681 a	4384 a	3666 a	4194 a	4378 d	1967 a	6156 ab	4295
6. Untreated C Farmer-Saved Seed	4240 a	5463 a	4225 a	3713 a	4242 a	4619 cd	2033 a	6279 a	4352
7. Treated A Certified	4023 ab	5627 a	4245 a	3689 a	4525 a	4950 abc	2087 a	6089 ab	4404
8. Treated A Farmer-Saved Seed	3911 b	5643 a	4128 a	4156 a	4408 a	5037 ab	2104 a	6127 ab	4439
9. Treated B Certified	3836 b	5229 a	4545 a	3414 a	4463 a	5077 ab	2213 a	5878ab	4332
10. Treated B Farmer-Saved Seed	4018 ab	5295 a	4417 a	4306 a	4495 a	4555 cd	2100 a	5739 b	4366
11. Treated C Certified	3902 b	5466 a	4244 a	4089 a	4245 a	4569cd	2126 a	6075 ab	4340
12. Treated C Farmer-Saved Seed	3772 b	5210 a	4256 a	3818 a	4248 a	4544 cd	2066 a	5986 ab	4238
L.S.D	267.5	NS	NS	NS	471.3	410.3	NS	500.5	---

Table 15. Significance of seed treatment, variety, and type effects on wheat protein at multiple locations in 2019.

	Protein							
	Indian Head	**Melfort**	**Outlook**	**Prince Albert**	**Redvers**	**Scott**	**Swift Current**	**Yorkton**
Effect	---------- p-values [z] ----------							
Seeding Treatment (S)	NS	NS	NS	NS	NS	NS	0.02	NS
Variety (V)	NS	NS	0.012	NS	NS	NS	NS	NS
S x V	NS	NS	NS	NS	NS	NS	NS	0.045
Type (T)	NS	NS	0.006	NS	NS	NS	NS	NS
S x T	NS	NS	NS	NS	NS	NS	NS	0.048
V x T	NS	NS	<0.00001	NS	NS	0.007	NS	NS
S x V x T	NS	NS	NS	NS	NS	NS	NS	NS

[z] p-values ≤ 0.05 indicate that a treatment effect was significant and not due to random variability

Table 16. Main effects of seed treatment, variety, and type of seed on wheat protein at multiple locations in 2019.

Main effect	**Protein**								
	Indian Head	**Melfort**	**Outlook**	**Prince Albert**	**Redvers**	**Scott**	**Swift Current**	**Yorkton**	**All Sites Average**
Seed Treatment	---------- % ----------								
Untreated	15.02 a	13.24 a	12.68 a	13.77 a	13.30 a	12.78 a	19.66 b	13.30 a	14.23
Treated	15.00 a	13.10 a	12.57 a	13.70 a	13.43 a	12.53 a	20.07 a	13.25 a	14.21
LSD	NS	NS	NS	NS	NS	NS	0.35	NS	---
Varietal comparison									
A	15.04 a	13.17 a	12.88 a	13.69 a	13.29 a	12.73 a	19.93 a	13.30 a	14.26
B	14.98 a	13.18 a	12.27 c	13.54 a	13.53 a	12.53 a	19.71 a	13.41 a	14.15
C	15.00 a	13.17 a	12.73 b	13.96 a	13.29 a	12.71 a	19.96 a	13.18 a	14.25
LSD	NS	NS	0.4	NS	NS	NS	NS	NS	---
Type									
Farmer Saved	15.04 a	13.18 a	12.86 a	13.58 a	13.40 a	12.78 a	19.79 a	13.27 a	14.25
Certified	14.98 a	13.17 a	12.38 b	13.88 a	13.34 a	12.53 a	19.94 a	13.33 a	14.20
LSD	NS	NS	0.34	NS	NS	NS	NS	NS	---

Table 17. Main effects of seed treatment, variety, and type of seed on wheat yield at multiple locations in 2019.									
Main effect	**Protein**								
	Indian Head	**Melfort**	**Outlook**	**Prince Albert**	**Redvers**	**Scott**	**Swift Current**	**Yorkton**	**All Sites Average**
Main Effects	---------- % ----------								
1. Untreated A Certified	15.2 a	13.1 a	12.6 a	13.4 a	13.1 a	12.9 a	19.6 a	13.6 a	14.19
2. Untreated A Farmer-Saved Seed	14.9 a	13.2 a	13.5 a	13.7 a	13.3 a	12.8 ab	19.8 a	13.5 a	14.34
3. Untreated B Certified	15.1 a	13.2 a	13.4 a	13.2 a	13.5 a	13.0 a	19.7 a	13.4 ab	14.31
4. Untreated B Farmer-Saved Seed	15.0 a	13.3 a	11.4 b	14.0 a	13.5 a	12.4 ab	19.4 a	13.4 ab	14.05
5. Untreated C Certified	15.1 a	13.4 a	12.6 a	14.0 a	13.5 a	12.6 ab	19.4 a	13.2 ab	14.23
6. Untreated C Farmer-Saved Seed	14.9 a	13.3 a	12.6 a	14.3 a	13.0 a	13.0 a	20.1 a	13.0 ab	14.28
7. Treated A Certified	15.0 a	13.2 a	12.6 a	13.7 a	13.5 a	12.3 ab	20.3 a	12.8 b	14.18
8. Treated A Farmer-Saved Seed	15.1 a	13.2 a	12.8 a	14.0 a	13.3 a	12.9 a	20.1 a	13.4 ab	14.35
9. Treated B Certified	14.9 a	13.1 a	13.0 a	13.5 a	13.4 a	13.1 a	19.8 a	13.5 a	14.29
10. Treated B Farmer-Saved Seed	15.0 a	13.2 a	11.3 b	13.5 a	13.7 a	11.7 b	19.9 a	13.4 ab	13.96
11. Treated C Certified	15.0 a	13.1 a	13.1 a	13.7 a	13.4 a	12.9 a	20.0 a	13.1 ab	14.29
12. Treated C Farmer-Saved Seed	15.0 a	12.8 a	12.7 a	13.8 a	13.3 a	12.4 ab	20.4 a	13.4 ab	14.23
L.S.D.	NS	NS	1.11	NS	NS	1.11	NS	0.61	---

Table 18 Discovery Seed Labs. Seed Quality Results					
	Years from Certified	**Germination**	**Vigour**	**Thousand Kernel Weights**	**Fungal Screen**
Indian Head					
a. Certified AAC Brandon	-	98	99	33.8	0%
b. Certified AAC Brandon	-	99	98	41.8	0.5% total fus
c. Certified AAC Elie	-	98	94	36.6	0%
a. Farmer-saved AAC Brandon	2	99	96	41.1	0.5% total fus
b. Farmer- Saved AAC Brandon	2	99	95	41.7	2% total fus
c. Farmer Saved AAC Elie	2	99	97	35.4	2% total fus
Melfort					
a. Certified AAC Brandon	-	98	96	40.5	0.5% total fus
b. Certified AAC Brandon	-	96	92	38.1	2% total fus; 0.5% F.gram
c. Certified AAC Brandon	-	97	94	44.8	3% total fus
a. Farmer-saved AAC Brandon	?	97	98	39.8	7.5% total fus
b. Farmer- Saved AAC Brandon	3	99	97	39.8	1% total fus
c. Farmer- Saved AAC Brandon	2	99	96	37.2	1% total fus
Outlook					
a. Certified AAC Brandon	-	99	93	40.0	1% total fus
b. Certified AAC Brandon	-	99	91	34.8	0%
c. Certified Cardale	-	99	92	36.0	0.5% total fus
a. Farmer-saved AAC Brandon	2	99	93	33.0	1.5% total fus

b. Farmer- Saved AAC Brandon	2	98	92	32.1	0%
c. Farmer-saved Cardale	2	99	92	37.0	0%
Prince Albert					
a. Certified Cardale	-	96	89	39.1	2.5% total fus; 0.5% F. gram.; 1% Coch.
b. Certified AAC Elie	-	77	74	39.3	4% total fus
c. Certified AAC Brandon	-	99	99	39.4	3.5% total fus
a. Farmer-saved Cardale	1	94	95	35.9	0
b. Farmer-saved AAC Elie	1	95	90	43	5.5% total fus
c. Farmer-saved AAC Brandon	3	88	92	40.4	18.5% total fus; 1.5% F. gram.
Redvers					
a. Certified AAC Brandon	-	97	89	40.1	1.5% total fus
b. Certified AAC Brandon	-	98	97	39.3	2.5% total fus; 1% F. gram.
c. Certified Transcend Durum	-	94	89	45.0	1.5% total fus
a. Farmer-saved AAC Brandon	3	99	95	40.5	0.5% F. gram.
b. Farmer-Saved AAC Brandon	2	98	93	39.0	2% total fus; 0.5% F. gram.
c. Farmer-saved Transcend Durum	2	97	86	43.0	0%
Scott					
a. Certified AAC Brandon	-	98	92	38.9	3% total fus
b. Certified AAC Elie	-	98	97	39.3	2% total fus

c. Certified Stettler	-	97	97	34.7	0.5% total fus
a. Farmer-saved AAC Brandon	2	96	96	39.2	3% total fus
b. Farmer-saved AAC Elie	2	92	92	33.2	0%
c. Farmer-saved Stettler	2	99	94	40.2	1.5% total fus
Swift Current					
a. Certified Transcend Durum	-	98	84	43.5	0%
b. Certified AAC Spitfire Durum	-	98	92	47.1	0.5% total fus
c. Certified CDC Fortitude Durum	-	98	96	38.1	0.5% total fus
a. Farmer-saved Transcend Durum	3	97	93	47.1	0%
b. Farmer-saved AAC Spitfire Durum	1	95	93	38.6	0%
c. Farmer-saved CDC Fortitude Durum	3	93	84	40.3	0.5% total fus
Yorkton					
a. Certified AAC Brandon	-	99	96	38.8	6% total fus
b. Certified AAC Brandon	-	99	97	34.3	0%
c. Certified AAC Elie	-	99	98	40.7	3.5% total fus; 0.5% Coch
a. Farmer-saved AAC Brandon	2	99	95	40.5	6.5% total fus
b. Farmer-saved AAC Brandon	2	98	89	43.1	3.5% total fus
c. Farmer-saved AAC Elie	2	96	97	40.1	1.5% total fus

Abstract

13. Abstract/Summary:

In 2019, trials were conducted at Yorkton, Redvers, Indian Head, Swift Current, Scott, Outlook, Prince Albert and Melfort to compare the vigor and yield performance of various lots of farmer-saved wheat seed relative to the same varieties of certified seed. Seedlots were compared with and without seed treatment to determine the impact of seed treatment on seedlots of differing quality. Positive effects of seed treatment on emergence, seedling vigor and grain protein were observed at Swift Current. However, there were a couple instances at Yorkton and Indian Head where seed treatment adversely affected yield. In most instances seed treatment did not affect emergence, seedling vigor, yield or grain protein of wheat.

Overall, seed quality was very good for both farmer saved seed and certified seedlots. However, levels of seed borne disease tended to be more variable on farmer saved seed. One seed lot of farmer saved seed had total *Fusarium* levels beyond acceptable levels. Despite this, the overall vigor of farmer saved seed seedlots were no different from certified seed. Few significant differences in emergence, seedling vigor, yield or grain protein were observed between planting farmer saved seed and certified seed. As a result, growing farmer saved seed would have been more economical because of the added cost of purchasing certified seed.

While the study found there were no risks to production by growing farmer saved seed in 2019, there is still value in purchasing certified seed as assures quality (true to type) for end users and allows for the introduction of better genetics to help the farm stay competitive.