MANITOBA CROP ALLIANCE

The Focal Point

Spring 2021 Edition

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MESSAGE FROM THE CHAIR

Fred Greig *– Reston, Manitoba*

Welcome to Manitoba Crop Alliance's (MCA) first edition of our research magazine, The Focal Point. You will see throughout the publication that MCA has established a comprehensive research program, built on a strong foundation from our five founding Manitoba commodity organizations. MCA is committed to building the program and working to increase the profitability of wheat, barley, corn, sunflowers and flax in Manitoba. We look forward to continue sharing valuable research that is funded by our members. From all of us at MCA, we hope that you enjoy The Focal Point and that you are able to utilize the information provided to benefit your farm.

Yours Truly,

Fred Greig
MCA Chair

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Each project featured in this publication is proudly funded by Manitoba Crop Alliance

▲ *The MCVET trials have been operational for the last 28 years in Manitoba.*

CULTIVAR DATA ACCESSIBLE TO ALL FARMERS

Manitoba Crop Variety Evaluation Team

Independent, third-party post-registration variety trials continues to be of great importance to Manitoba farmers. For this reason, the Manitoba Crop Variety Evaluation Trial (MCVET) results are always a trusted and highly anticipated resource to farmers each year.

Co-ordinated by the MCVET committee, the trials have been operational for the last 28 years. Annually, MCVET collects data on an average of 20 major and minor crop types at 20 different locations. The MCVET committee consists of members from the Manitoba Seed Growers Association (MSGA), the Canadian Seed Trade Alliance, Agriculture and Agri-Food Canada, the University of Manitoba, Manitoba Pulse and Soybean Growers and the Manitoba Crop Alliance (MCA). Manitoba Agriculture & Resource Development (ARD) employees sit as non-voting advisors and observers on the MCVET committee. Representative names will be put forward for their position on the MCVET committee from each member group. The current MCVET chair is Jennifer Seward of the MSGA.

Spokesperson:

Chami Amarasinghe

Research and Development Specialist (Ag Genetics), Manitoba Agriculture and Resource Development

Annual planning for variety evaluation trials starts in January, when the MCVET committee determines the number and types of variety trials and locations for the upcoming growing season. Entry lists of new and current crop varieties are compiled based on a call for new entries sent out to all seed companies and

▲ *Chami Amarasinghe is the MCVET co-ordinator and works alongside her committee to ensure farmers receive the most up to date information on new varieties.*

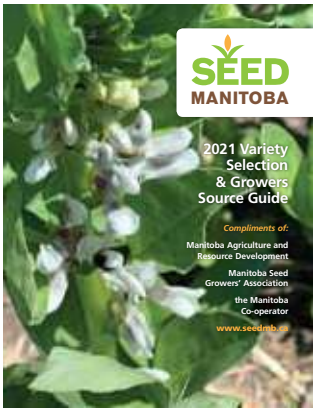
breeders by March 1. Varieties are accepted for testing in either one of two categories: newly registered varieties or lines that have been supported for registration and are being grown/marketed in Manitoba or sponsored varieties and advanced co-op entries tested at the request of an institution or company.

Once the entry list is confirmed, plot randomizations are created using the AGROBASE Generation II software. Entries are replicated three to four times to control variation in plots due to soil topology, fertility or other factors. Seed is supplied to seed packaging co-operator, who will then treat and package it, which are later sent out trial co-operators along with plot information, workbooks and protocols.

Once seeding is completed, all MCVET trials are inspected by ARD staff twice in the growing season. One tour is conducted post seeding in early July and the other tour pre-harvest in late August to determine if the trials were well-maintained with no significant issues.

About MCVET

The Manitoba Crop Variety Evaluation Trials (MCVET) serves as an independent third-party crop variety evaluation program for farmers and Manitoba's seed industry. The MCVET committee oversees the production of an annual variety performance report, *Seed Manitoba*. The report is based on impartial trials commissioned, approved or overseen by the MCVET committee. The publication is intended to provide farmers, agronomists and others with unbiased, accurate varietal performance information relevant to Manitoba growing conditions.



MCVET Committee: **Chami Amarasinghe** (MCVET co-ordinator), **Ana Badea**, **Anita Brule-Babel**, **Tracy Court**, **Dane Froese**, **Paul Gervais**, **Anne Kirk**, **Dennis Lange**, **Mallorie Lewarne**, **Brad Pinkerton**, **Jennifer Seward** (MCVET chair) and **Cassandra Tkachuk**

Prior to publication, data collected from MCVET trials are reviewed by the MCVET committee. Plant breeders and statisticians on the committee provide advice on statistical analysis and make sure that data are accurate and reliable.

"It's important to have third-party data that's impartial," says Daryl Rex, research trial specialist with MCA. "This is generally the best way to screen a large amount of genetics at one time and compare them within each group."

Throughout the summer, Rex will visit the trial sites, observe the corn and sunflower crops' performance at various stages and then summarize the data. Data sets are later shared with the provincial government's MCVET representatives, as well.

MCVET plots also serve as a good resource for other research projects, such as provincial disease surveys focused on Fusarium Head Blight, wheat leaf rust and oat crown rust. The trials are particularly attractive for disease surveys and other research projects because no fungicides are applied for MCVET plots. The main purpose of variety trials is to test the true genetic potential of varieties.

The annual results appear in the *Seed Manitoba* guide for farmers to make informed choices, compare varieties, classes and have a strong understanding of seeds they may purchase prior to spring.

The one-stop shop lets farmers very simply compare agronomics and results of the trials in a no-pressure environment. The entire province wide variety evaluation program is co-ordinated by Chami Amarasinghe, Research and Development Specialist (Ag Genetics) with Manitoba Agriculture and Resource Development.

Currently, MCVET is the only third-party variety evaluation program in Manitoba that will provide farmers truly neutral information about new or newly registered varieties.

"We provide unbiased data to farmers that helps them make informed decisions about their variety choices," says Amarasinghe, who also analyzes data from MCVET trials. "When I go to seed growers' meetings, they really appreciate this data and would like to continue this program."

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▲ ***Annually, MCVET collects data on an average of 20 major and minor crop types at 20 different locations.***

▲ ***The Seed Manitoba guide gives farmers access to countless data tables and lets them see the latest news on varieties that are up and coming in the province.***

The provincial government, different crop groups as well as seed companies help co-fund MCVET, all recognizing the importance of the variety evaluation being done. In that sense, it is a collaboration like no other in Manitoba.

Digital delivery

In addition to printed guide, Seed Manitoba, its website contains a vast repository of information about MCVET, its unique Seed Variety Selection Tool (SVS) and web-exclusive data, typically not available at press time. The SVS continues to grow in popularity as it allows farmers to select their own check variety to compare directly to a new or commonly grown variety at locations of their choice and get receive a Yield Comparison Report. Farmers also can develop Multi-Year Yield Summary Reports to get yield data on a group of varieties tested together within a specific time span at the locations of their choice.

The next addition to the website will be a tool released in spring 2021 called Digital Online Field Tour, which will be linked with SVS to benefit seed growers and farmers and allow them to see new varieties with agronomic, disease and quality data and compare them to current varieties they grow at their farm. Cereals will be the first crops available to view through the forthcoming tool.

For more information on MCVET and to access content from Seed Manitoba, visit seedmb.ca

▲ ***The MCVET committee has representatives from seven different organizations, including the Manitoba Crop Alliance.***

HITTING THE DENSITY SWEET SPOT

Determining optimum target plant stands for spring cereal crops in Manitoba

Similar to fertility rates and trying to optimize those to achieve maximum crop profitability, seeding rates play a vital role in overall crop success and financial return. With that in mind, it is critical farmers maximize their seed when it comes to seeding density to achieve the best plant stands per square foot (plants/ft^2). Current provincial guidelines for target plants/ft^2 are 23-28 for spring wheat and 22-25 for barley. A 2016 study conducted in North Dakota successfully demonstrated that optimum seed rates for spring wheat ranged from 14-46 plants/ft^2 depending on varietal characteristics. Kirk's project aimed to re-examine provincial recommendations and gauge if they are still accurate given current varieties and agronomic practices.

The research was conducted between 2017 and 2018 at the government's Crop Diversification Centres in Arborg, Carberry, Melita and Roblin. The randomized complete block design with factorial treatments was replicated three times at each site. No quality parameters were evaluated in this study.

Each crop type had two cultivars planted. For wheat, AAC Brandon and Prosper were selected and the barley trialed was AAC Synergy and CDC Austenson.

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Lead Researcher:

Anne Kirk

Manitoba Agriculture and Resource Development

Researcher bio: Anne Kirk is the cereal crop specialist with Manitoba Agriculture and Resource Development. Prior to starting this position in 2016, she worked with the Natural Systems Agriculture Lab at the University of Manitoba.

Collaborators: Haider Abbas, Earl Bargen, Scott Chalmers, James Frey, Nirmal Hari, Craig Linde, Rejean Picard and Manitoba Agriculture and Resource Development

Each variety was planted at densities of 15, 21, 27, 33 and 39 plants/ft² throughout the project *(Table 1)*.

Kirk's field work demonstrated government recommendations are still sufficient for Manitoba farmers. Almost all categories had no major statistical differences.

For plant stand, establishment increased as seeding rates increased at most site years. There was no difference in plant stand across treatments for wheat at Roblin 2017 and Arborg 2018, and barley at Carberry 2018 and Roblin 2018. Results are not shown for sites where a range of populations were not established.

With heading, wheat reported no major difference in heads/ft² at any site. However, regarding barley, there were notable differences between the two varieties. CDC Austenson outperformed AAC Synergy *(Table 2)*.

In addition, Kirk found no significant difference in heads/ft² between seeding rates at two of four wheat sites and four of five barley sites.

This is important since it displays how cereals offset lower plant populations with increased tillering.

Yield variance between sites was minimal for barley and wheat, although some instances did show statistical anomalies. Wheat at Carberry and Melita 2017 had six- and eight-bushel differences, respectively. Barley had two notable variances at Arborg 2017 and Melita 2018 of 11 and five bushels, respectively.

Overall, study results suggest that current recommendations for farmers are sufficient and do not need to be changed at this time. Despite the five different seeding rates applied throughout the research, it was evident the results fit within the generally accepted parameters from the Manitoba government.

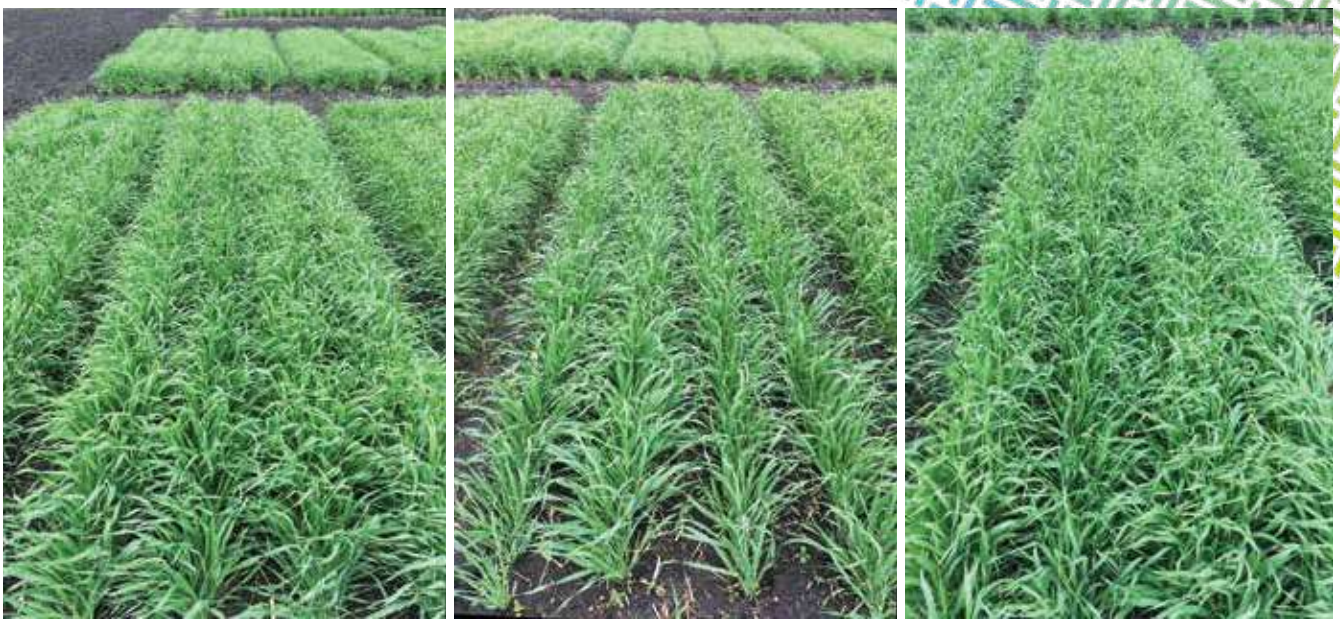
TABLE 1 | CROP TYPES, VARIETIES AND TARGET PLANT STANDS STUDIED

Crop Type	Variety	Target Plant Stand (pl/ft²)
Spring Wheat	AAC Brandon	15, 21, 27, 33, 39
	Prosper	15, 21, 27, 33, 39
Barley	AAC Synergy	15, 21, 27, 33, 39
CDC Austenson		15, 21, 27, 33, 39

TABLE 2 | CROP HEADING PERFORMANCE

Heads/ft² for wheat, barley and oat at the Arborg (Arg), Carberry (Car), Melita (Mel), and Roblin (Rob) locations. Wheat varieties are AAC Brandon (A) and Prosper (B), barley varieties are AAC Synergy (A) and CDC Austenson (B). At sites with significant differences between treatments, means within the same site year followed by the same letter within a column are not significantly different.

	Wheat				Barley				
	Arb 17	Car 18	Mel 17	Mel 18	Arb 17	Arb 18	Mel 17	Mel 18	Rob 17
	Heads/ft²								
Variety									
A	48	34	34	44	56	47b	36b	58	65
B	51	33	31	44	54	53a	44a	58	68
Pr>F	*ns*	*ns*	*ns*	*ns*	*ns*	*	*	*ns*	*ns*
LSD	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*2.5*	*5*	*n/a*	*n/a*
Target Plant Population (pl/ft²)									
15	48	29	23b	37c	55	53a	34	58	67
21	46	32	33a	38c	57	53a	40	60	69
27	48	33	30ab	46b	51	52a	38	57	60
33	54	38	38a	51a	55	47b	42	59	64
39	52	35	39a	47a	57	45b	46	55	72
Pr>F	*ns*	*ns*	*	*	*ns*	*	*ns*	*ns*	*ns*
LSD	*n/a*	*n/a*	*9.5*	*4.5*	*n/a*	*4.0*	*n/a*	*n/a*	*n/a*



▲ *LEFT: AAC Synergy seeded at 27 plants/ft². MIDDLE: AAC Synergy seeded at 15 plants/ft². RIGHT: AAC Synergy seeded at 39 plants/ft².*

ON YOUR FARM

Cereals seeding density still appropriate for Manitoba farmers

Spring cereals are vital to Manitoba grain farms. Barley and wheat are both influenced by a variety of factors, including cultivar selection, seeding dates and rates as well as plant stands. Throughout Anne Kirk's research, it evaluated the recommended seeding rates and its potential effect on yield.

The research showed that the recommended rates set out by Manitoba Agriculture and Rural Development, which were developed a number of years ago, are still appropriate for farmers today.

In addition, it appears that seeding rates between different varieties did not differ in such a significant way that official recommendations were put forward to change government reference numbers. There is a possibility in the future that newer spring cereals may be subject to different recommendations, but at this time everything is sufficient.

This research is good news for farmers who are replacing seed annually. As inputs costs, such as seed, continue to rise, it is vital that farmers maximize their return on investment as best they possibly can. This is often measured on a per bushel net return.

It was interesting to note, however, that there were not substantial differences in the findings at the four different sites, which all have unique soil profiles (Peguis clay, Wellwood loam, Waskada loam and Erickson loamy clay). There were some yield differences, but those may have been influenced by environmental factors such as rain and relative moisture.

On the whole, Manitoba farmers have certainly been increasingly interested about seeding rates. Knowing this, the Manitoba government responded and prioritized research in conjunction with the Manitoba Crop Alliance and other groups to re-examine the recommendations.

Kirk believes it is important for farmers to consider their target plant populations. And while government does have its own recommendations, it is still important for farmers to see where that comes from and that the recommendations are in line with current agronomic best management practices related to today's cultivars.

"It's important to be conscious to be aware of what seeding rates are," says Kirk. "You do not want to be overseeding, but you want the crop to get off to a good start."

The research did show, however, that seeding rates should be adjusted based on a specific variety's ability to tiller. Lower populations means increased tillering, but Kirk advises growers to be aware of what that threshold is in order to be generating the best possible stand with the greatest start possible.

For more information about this research and other Manitoba Crop Alliance projects, visit mbcropalliance.ca

GET THE MOST OUT OF YOUR NITROGEN

Cross-Canada agronomic and environmental benefit of advanced 4R nitrogen management of grain corn

The importance of proper nitrogen management on corn is clear to all farmers. One of the largest input costs year in and year out at any operation, nitrogen is being evaluated continuously on many performance aspects. A topical question for farmers and researchers alike is if even more could be done with the same or less in order to maximize return on investment. Simultaneously, a key goal that continues is to reduce environmental loss and determine if advanced 4R nitrogen management conditions change the most economical rate of nitrogen (MERN) to use during the growing season.

Research led by Mario Tenuta, this research is part of a four-year study that concludes in 2023. His research is being conducted in Ontario, Quebec and locally at Carman, Man. Results were somewhat hampered in both years due to late season droughts, which reduced yield. In addition, COVID-19 lockdowns and laboratory restrictions made it difficult to finish soil, plant and gas analyses.

Pre-plant N treatments

In 2018, ESN had a lower performance compared to SuperU and Urea. This was likely because ESN was used without blending with some urea. The following year, SuperU had the lowest average performance.

▼ ***BELOW: Graduate student Claudia Esparza (foreground) and her student assistant Adam Freiling take canopy reflectance measures for nitrogen status of corn of a 4R nitrogen trial site near Carman.***

Lead Researcher:

Dr. Mario Tenuta

Senior Industrial Research Chair for 4R Nitrogen Stewardship

Researcher bio: Mario Tenuta is the NSERC/WGRF/Fertilizer Canada Industrial Research Chair in 4R Nutrient Stewardship and professor of Applied Soil Ecology at the University of Manitoba. His training includes a BSc in botany and physical geography, an MSc in soil science, a PhD in plant sciences and post-doctoral research in nematology.

Collaborators: Curtis Cavers, Craig Drury, David Hooker, Gaetan Parent and Joann Whalen

The ESN performance was lowest, or tied for lowest at five different rates (0, 55, 80, 110 and 170 kg/ha of nitrogen). In 2019, SuperU was lowest on three rates (80, 110, 170), while rates of 0 and 55 showed a virtual tie between all three nitrogen types *(Graph 1)*.

In-season response of dribble band UAN

During the first two years of the study, 2018/2019, there were no significant effects on the yield of the three nitrogen sources tested—UAN, AgroTain, AgroTain Plus—although AgroTain Plus had the lowest performance of the three nitrogens tested *(Graph 2)*.

Yield response to in-season UAN dressing

In both years, 2018/2019, UAN dribble performed significantly better of the three in-season placements tested—surface dribble, shallow side-dress and deep side-dress—although the 2019 surface dribble was best while deep side-dress was the worst.

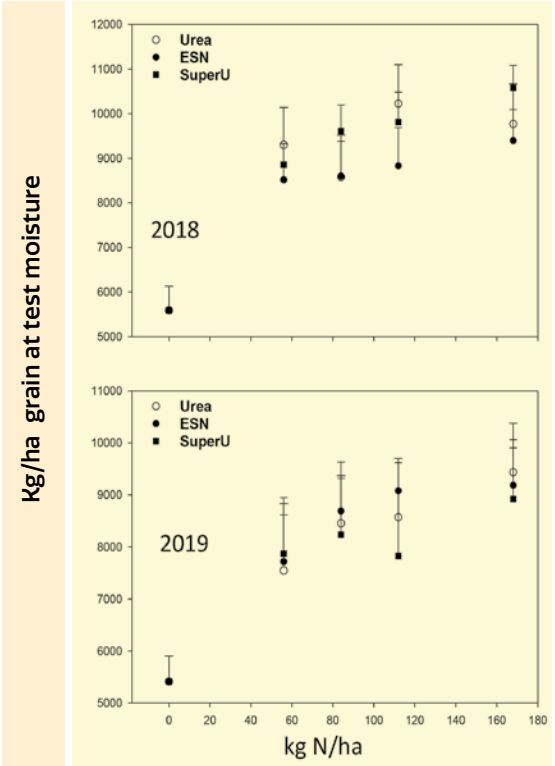
Despite the full project not being completed, early findings show, at least in terms of raw data, there is not a clear advantage of an in-season nitrogen application. Weather-related factors such as rainfall may have been a contributing factor to the results as both years were dry.

As corn yields continue to increase, nitrogen has to keep in step with that, but Tenuta cautions that the dollar costs of fertilizer and nitrogen escapes to the environment will push to get more yield out of nitrogen applications.

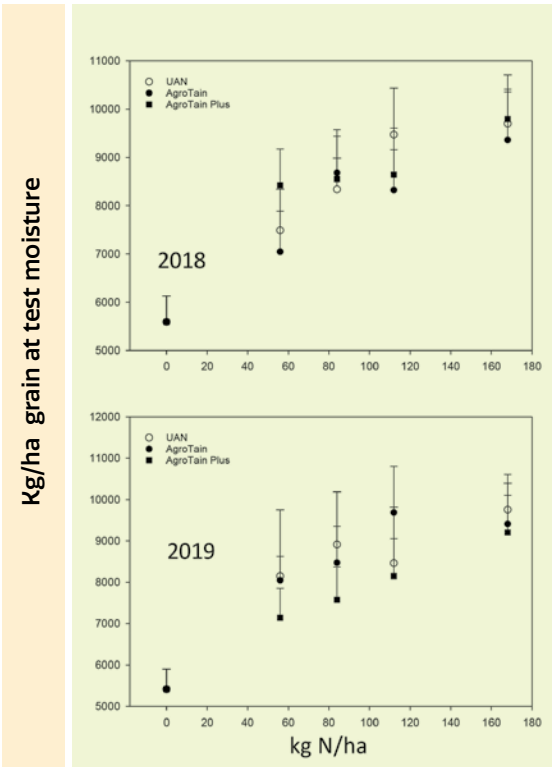
"Getting more yield bang for fertilizer additions with less environmental impact needs to be a major goal now so future yields are not constrained by nitrogen additions" he says.

PHOTOS: MARIO TENUTA

GRAPH 1 | NITROGEN RATES



GRAPH 2 | NITROGEN TESTED



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ON YOUR FARM

Prudent nitrogen use to achieve greater profitability, sustainability

▲ ***ABOVE: Technician Megan Westphal weighing corn grain combined from a 4R nitrogen trial site.***

▶ ***OPPOSITE: Technician Megan Westphal combining a plot of a 4R nitrogen trial site near Haywood.***

Corn in Manitoba continues to become a key contributor to the province's agricultural output. With consistently over 450,000 planted acres between both grain and silage corn, farmers are eager to continue with it. There are concerns about how to maximize return on agronomic inputs, though, namely nitrogen. The return farmers seek coincides with the increased investment they continue to make with hybrid cultivars.

Typically, nitrogen tests are done through soil samples to calculate residual nitrate. From there, a farmer can know their yield goal based on what variety or hybrid they are growing and set a nitrogen target. However, after doing this practice for years but getting no yield difference, it seems as though change is needed.

Recent research and data demonstrate that farmers generally adhere to their usual nitrogen program. They adjust rates based on increasing yield goals that, but that may cost them both profit in the long run if yield suffers.

Newer options available to farmers such as polymer-coated urea such as ESN as well as SuperU (urea fertilizer containing urease and nitrification inhibitor) showed a strong pre-plant response compared to in-season applications and dressings, both side and top. The SuperU outperformed the AgronTain (urea ammonium nitrate solution fertilizer containing a urease inhibitor) and AgroTain+ (urea ammonium nitrate solution fertilizer containing a urease and nitrification inhibitor), which were applied during an in-season dribble band of UAN.

Early research results such as this show that Manitoba farmers can simply do one pre-plant application and saves themselves the time and money it takes to make additional in-season applications.

In-season nitrogen applications, either through a top-dressing or side dressing without various inhibitors, have proven not to be disadvantageous. This is good news for farmers as it gives them a little bit of breathing room during the growing season and relieves some of the pressure to get it all done immediately during spring seeding. The in-season application should give farmers a better nitrogen delivery and avoid losses before the corn's peak nitrogen demand.

Research conducted by Mario Tenuta shows that in a year where planting is not delayed and there are no significant rainfall events, at-plant nitrogen addition gives similar performance as nitrogen dressing at the four-leaf stage.

The reality is that farmers will want more return on their nitrogen investment. Also, farmers will have to remain vigilant about shifting societal expectations for environmental stewardship, which could further increase farmers' pressure to reduce greenhouse gases such as nitrous oxide, ammonia volatilization losses, and nitrate leaching. These losses of nitrogen are ultimately wasted farmer money.

Tenuta labels reduced GHGs and better use of farmers' nitrogen inputs a true win-win because they save money and protect the environment.

PHOTOS: MARIO TENUTA

CANADIAN VS. EUROPEAN VARIETIES

Determining agronomic suitability of European flax (linseed) cultivars in agro-Manitoba

Flax acres in Manitoba have remained under 100,000 since 2016 despite current varieties performing well in most agronomic categories. Investment continues to decline, only a single breeder remains in Western Canada and the crop has been largely hedged out by canola and soybean preferences.

Because of this, the former Manitoba Flax Growers Association, together with provincial oilseeds specialist Dane Froese thought established European varieties may be a suitable option in Manitoba if they demonstrated enhanced yield, height, days to maturity and flowering period in typical growing conditions.

The two-year study in 2018 and 2019 compared Canadian check CDC Bethune against six well-established European cultivars at research sites in Arborg, Melita and Roblin. The European cultivars were sourced from Limagrain and van de Bilt saden en vlas and adjusted to Canadian specifications so all experiments were equal at 40 pounds per acre of seed, a rate consistent with MCVET plot trials. Research test conditions were drier in 2018 compared to 2019.

Yield

There were significant yield differences between CDC Bethune and four European lines at both Melita 2018 and Roblin 2019 (Tables 1 and 2). At Melita 2018 there was a 6.1 bu/ac difference between Bethune and the lowest-yielding European line Biltstar (35.4 to 29.3 bu/ac). At Roblin 2019, during a year of more average moisture, Bethune outperformed Biltstar by 13.1 bu/ac, 57.5 to 44.4. LG Lion significantly outperformed Bethune in Melita in 2018.

Many varieties came very close to CDC Bethune in all sites, or were significantly lower-yielding.

In three of six site years, European lines outperformed CDC Bethune, however, the difference was not statistically significant, excluding Melita 2018.

▲ ***While certain European lines performed well in Canada, it is not recommended they be pushed for commercialization in the country.***

PHOTOS: DANE FROESE

TABLE 1 | STATISTICAL YIELD COMPARISON IN EUROPEAN FLAXSEED TEST IN 2018

		2018 Yield						
		Arborg		Melita			Roblin	
VARIETY		kg/ha	bu/ac	kg/ha	bu/ac		kg/ha	bu/ac
CDC Bethune		1675.00	26.6	2226.67	35.4	*ab*	2057.00	32.7
OVB 1001-01		1673.67	26.6	2168.67	34.5	*ab*	1959.00	31.1
LG Lion		1717.00	27.3	2313.67	36.8	*a*	1598.33	25.4
Batsman		1559.67	24.8	1973.00	31.4	*cd*	1669.67	26.5
LG Aquarius		1357.67	21.6	2156.33	34.3	*b*	1518.00	24.1
OVB 0815-02		1361.67	21.7	2116.33	33.6	*bc*	1564.67	24.9
Biltstar		1447.33	23.0	1840.00	29.3	*d*	1608.33	25.6
	SITE GRAND MEAN	1541.72	24.5	2113.52	33.6		1710.71	27.2
	CV %	9.1		3.7			14.8	
	LSD	-	-	140.80	2.2		-	-
	Sign Diff	No		Yes			No	

TABLE 2 | STATISTICAL YIELD COMPARISON IN EUROPEAN FLAXSEED TEST IN 2019

		2019 Yield						
		Arborg		Melita			Roblin	
VARIETY		kg/ha	bu/ac	kg/ha	bu/ac		kg/ha	bu/ac
CDC Bethune		2119.00	33.7	2719.00	43.2		3616.00	57.5	*a*
OVB 1001-01		1885.00	30.0	2798.00	44.5		3166.00	50.3	*bcd*
LG Lion		1960.00	31.2	2704.00	43.0		3464.00	55.1	*ab*
Batsman		1933.00	30.7	2848.00	45.3		3071.00	48.8	*cde*
LG Aquarius		1833.00	29.1	2849.00	45.3		3302.00	52.5	*abc*
OVB 0815-02		1913.00	30.4	2738.00	43.5		2689.00	42.8	*ef*
Biltstar		1844.00	29.3	2758.00	43.9		2792.00	44.4	*def*
	SITE GRAND MEAN	1926.71	30.6	2773.43	44.1		3157.14	50.2	
	CV%	7.3		6.0			7.0		
	LSD	-	-	-	-		395.40	6.3	
	Sign Diff	No		No			Yes		

TABLE 3 | STATISTICAL COMPARISON OF MATURE FLAX PLANT HEIGHT IN 2018

		2018 Height								
		Arborg			Melita			Roblin		
VARIETY		cm	in		cm	in		cm	in	
CDC Bethune		44.0	17.3	*a*	62.0	24.4	*a*	55.3	21.8	*a*
OVB 1001-01		36.0	14.2	*cd*	51.7	20.3	*b*	55.7	21.9	*a*
LG Lion		38.0	15.0	*bcd*	51.7	20.3	*b*	46.0	18.1	*b*
Batsman		40.0	15.7	*abc*	53.3	21.0	*b*	48.0	18.9	*b*
LG Aquarius		37.0	14.6	*bcd*	49.3	19.4	*bc*	45.7	18.0	*b*
OVB 0815-02		36.3	14.3	*cd*	50.0	19.7	*bc*	46.3	18.2	*b*
Biltstar		41.7	16.4	*ab*	46.0	18.1	*c*	45.3	17.8	*b*
	SITE GRAND MEAN	39.0	15.4		52.0	20.5		48.9	19.3	
	CV %	6.8			5.9			7.4		
	LSD	4.7	1.9		5.5	2.2		6.4	2.5	
	Sign Diff	Yes			Yes			Yes		

TABLE 4 | STATISTICAL COMPARISON OF MATURE FLAX PLANT HEIGHT IN 2019

		2019 Height						
		Arborg		Melita		Roblin		
VARIETY		cm	in	cm	in	cm	in	
CDC Bethune		44.0	17.3	57.0	22.4	64.0	25.2	a
OVB 1001-01		37.0	14.6	59.0	23.2	56.0	22.0	b
LG Lion		40.0	15.7	53.0	20.9	44.0	17.3	c
Batsman		37.0	14.6	58.0	22.8	50.0	19.7	bc
LG Aquarius		38.0	15.0	57.0	22.4	48.0	18.9	c
OVB 0815-02		35.0	13.8	54.0	21.3	48.0	18.9	c
Biltstar		39.0	15.4	49.0	19.3	49.0	19.3	c
	SITE GRAND MEAN	38.5	15.2	55.3	21.8	51.1	20.1	
	CV %	-		-		7.3		
	LSD	-	-	-	-	6.7	2.6	
	Sign Diff	No		No		Yes		

Lead Researcher:

Dane Froese

Oilseeds Specialist, Manitoba Agriculture and Resource Development

Researcher bio: Dane Froese is the provincial oilseeds specialist at Carman. His work in oilseeds extension and agronomy with the department has allowed for a comprehensive view of flax and other oilseed production across Manitoba since 2017. Projects include working with improving flax management practices, small-patch management of clubroot and developing extension resources.

Collaborators: Scott Chalmers, Westman Agricultural Diversification Organization; Nirmal Hari, Prairies East Sustainable Agriculture Initiative; James Frey, Parkland Crop Diversification Foundation; Manitoba Flax Growers Association; Shannon Froese, Crop Development Centre and BASF

TABLE 5 | DAYS TO PHYSIOLOGICAL MATURITY 2018

Variety	Arborg	Melita	Roblin	Average
CDC Bethune	95	84	82	87
OVB 1001-01	98	86	81	88
LG Lion	94	85	79	86
Batsman	91	84	77	84
LG Aquarius	90	83	74	82
OVB 0815-02	91	84	79	85
Biltstar	91	84	76	84

TABLE 6 | DAYS TO PHYSIOLOGICAL MATURITY 2019

Variety	Arborg	Melita	Roblin	Average
CDC Bethune	92	92	84	89
OVB 1001-01	91	96	105	98
LG Lion	92	93	106	97
Batsman	90	95	101	95
LG Aquarius	91	98	102	97
OVB 0815-02	90	99	104	98
Biltstar	92	100	119	104

TABLE 7 | LENGTH OF FLOWERING PERIOD (IN DAYS) IN 2018

Variety	Arborg	Melita	Roblin	Average
CDC Bethune	29	22	11	21
OVB 1001-01	31	25	11	22
LG Lion	20	15	10	15
Batsman	13	22	11	15
LG Aquarius	16	17	11	15
OVB 0815-02	16	22	12	17
Biltstar	16	12	13	14

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Height

All three 2018 sites showed significantly large height differences (*Table 3*). The biggest statistical difference was at Roblin 2019 where CDC Bethune was the tallest by three inches and was an average of 5.1 inches taller than the average height of 20.1 inches (*Table 4*).

Days to maturity and flowering period

Days to maturity (75 per cent bolls brown and rattling) was virtually identical at Arborg 2018 and 2019. Melita and Roblin 2018 reached maturity faster than in 2019. Reasons for the differences may have been rainfall and environmental factors. In 2018, European lines were +1 to -5 days different compared to a check average maturity of 87 days (*Table 5*) and ranked +6 to +9 in 2019 vs. a check of 89 days *(Table 6*).

On average, the flowering periods for Europeans lines ranged from +1 to -7 days vs. CDC Bethune 2018 (21 days) (*Table 7*) and +4 to -1 against the check in 2019 (34 days). No data was collected from Melita 2019.

The project did show that Canadian-bred flax lines are competitive with European lines, therefore it is not recommended that Canadian seed companies try and commercialize current European lines because there is no statistically significant advantage. CDC Bethune, a western Canadian staple variety, performed better in nearly all instances than European-origin flax varieties, and continues to hold significant market share in Manitoba, along with other CDC and Agriculture and Agri-Food Canada lines.

ON YOUR FARM

Flax in Manitoba is profitable, breaks up disease cycles

With flax having taken a backseat in recent years to other crops, investment has similarly seen a reduction. The current cultivars perform well, but the sole Canadian breeding program at the Crop Development Centre at the University of Saskatchewan is not able to bring new varieties to trials, registration and market as fast as other crops due to slower traditional breeding methods.

It made sense to look at the adaptability of consistently high-performing European lines and determine if there is a place for them in Manitoba fields. While it was clear that current Canadian varieties are superior and European varieties are not being recommended for local registration, there were a few that performed well. The European varieties are generally suited for wetter climates, such as those found in northwestern Europe, where all six trial lines were sourced.

One key piece that has become of increasing interest to flax farmers is a variety with reduced height. Certain current high-performing varieties such as CDC Glas produce a sizable amount of straw. However, farmers often prefer a somewhat shorter variety, since the flax residue may be a nuisance if no straw market exists.

Despite a recent shift away from flax, this high-value rotational crop brings many key agronomic benefits with it. As a non-host for multiple diseases and helping to break the disease cycle and balance rotations.

Flax contains resistance to Fusarium wilt and a low natural susceptibility to sclerotinia. Clubroot and verticillium stripe still do not affect flax.

In addition, flax has achieved higher yields with earlier seeding dates—around May 1—and the use of a fungicide, it can crack the 40-bushel threshold and be harvested mid-August, according to Scott Chalmers, diversification specialist with Manitoba Agriculture and Resource Development (MB ARD).

As other crops intensify in their rotations, particularly canola, a major concern is when resistance starts to break down. Farmers needs something they can turn to drive decent yield and profit. Flax may be that good fit as an alternative oilseed.

"By having vibrant and viable crop options in every sector, not just one or two racehorses leading the pack, farms can be more profitable in the long run. Farmers that specialize in flax tend to find it can be their top performer year after year," says Dane Froese, oilseeds specialist with MB ARD. He adds that a rotation of canola-wheat-soy-canola would benefit from canola-wheat-soy-flax-canola for tilth and disease reasons.

With typical floor prices around $13/bu, flax brings financial benefits, as well. The crop commands premiums in the health food sector and with Manitoba farmers achieving yields of 30-plus bu/ac, it is easy to see why those who grow flax continue to grow flax.

BROAD SHOULDERS

Research aimed to provide sunflower farmers with new varieties well-suited for confectionary markets

Sunflower farmers in Manitoba will soon be able to access much-improved hybrid cultivars thanks to nine years of breeding efforts.

Part of a longer project that began with the National Sunflower Association of Canada, research has now been incorporated into the Manitoba Crop Alliance. Michael Hagen of CanSun LLC in Fargo, North Dakota, works on the development of the hybrid cultivars which are herbicide-tolerant, high-yielding and carry genetic resistance to the major sunflower diseases in Canada. These new cultivars also have longer seed types, carry a broad shoulder, have high test weights and meat-to-hull ratios.

In 2020, 132 preliminary hybrids and 12 advanced hybrids were selected for testing in two Manitoba trial locations. From a total of 144 hybrids, 12 were selected for advanced trials and all contain genes for resistance to downy mildew and/or rust, with four hybrids resistant to both downy mildew and rust. Currently, the program carries 89 male lines and 47 female lines which are all herbicide-tolerant.

The new lines are all tested against yield checks 6946 DMR and Panther DMR and herbicide check P63ME70. All hybrids selected for advancement in 2020 showed yield performance similar to, or greater than the check hybrids and test weights were all 25 pounds or greater. Several advanced hybrids showed exceptional meat-to-hull ratios exceeding 60 per cent nutmeat.

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Lead Researcher:

Michael Hagen

Sunflower Breeder for CanSun LCC

Researcher bio: Michael Hagen has 35 years of experience in sunflower breeding and seed production. Hagen began developing confectionary and oilseed sunflower hybrids in 1986. In 2011, Hagen aligned with the National Sunflower Association of Canada to develop a Canadian confection breeding program. Hagen operates under the company of CanSun LLC, located in Fargo, North Dakota.

Collaborators: Darcelle Graham and Daryl Rex

PHOTOS: DARCELLE GRAHAM/MANITOBA CROP ALLIANCE

EX35957 was tested in pre-commercial strip trials in 2020 and exceeded the check hybrids in two out of three locations. It is scheduled for pre-commercial strip trials again in 2021.

Due to Manitoba's short growing season, all hybrids that advance must have similar, or earlier, days to maturity versus the checks. The hybrids are also selected for longer and broader seed size types. Newer hybrids have been selected to reach lengths of anywhere between 13 to 19 mm. The seeds have a broad shoulder and dark clean colour. New hybrids also contain nutmeat percentages of 55 to 60 per cent and will continue to be selected on this criteria. Breeding for both seed length and shoulder width offers multiple marketing streams for farmers and processors, as the seed meets demands in both the domestic and international marketplace.

The development of herbicide-tolerant elite parent lines with resistances represent a critical achievement for the project.

"The program is starting to turn the corner in terms of being able to isolate higher numbers of hybrids from year to year that possess all the critical characteristics needed to be considered for commercialization," he says.

Research continues to select for hybrids that show resistance to sclerotinia head rot, of which there is no known gene for resistance.

With many hybrids coming out of his program, he believes they will demonstrate all-around improved agronomics for farmers.

▲ ***ABOVE: Sunflowers ready for seed selection post-harvest.***
▼ ***BELOW: Sunflower breeder Michael Hagen of CanSunLLC hopes Manitoba farmers will have access to two high-yielding sunflower hybrids by spring 2023.***

ON YOUR FARM

New confectionary sunflower varieties coming soon to a farm near you

The dominant sunflower variety in Canada is numbered line 6946 DMR, which has been the premier hybrid for the last 35 years.

Thanks to continued research efforts that began in North Dakota and now operate in Manitoba, provincial sunflower varieties could begin to have a new look by 2023 as new herbicide-resistant hybrid cultivars with commercial potential have been isolated. They are currently in the pre-commercial strip trial phase of testing.

The new hybrids demonstrate improvement on six vital agronomic categories to be advanced in the breeding program and ultimately become commercially available for farmers. Hagen says the key characteristics for farmers to have new and improved sunflowers cultivars in Canada are: high yield potential, early maturity , good standability, good level of disease tolerance, possess the target seed type and have test weights of 25 pounds or higher.

With a longer, less-rounded seed coat, such as 6946 DMR, and a wider shoulder, the new hybrids have broader appeal for the commercial confectionary market. Increased nutmeat ratios also bode well for farmers who grow on contract with processors.

Certain cultivars have shown earlier maturity compared to 6946, including EX 35957, which has shown earlier maturity of four days compared to 6946, a positive factor for a long season crop.

One of the biggest pluses of the entire breeding programs for Canadian farmers is ownership. New hybrids will be wholly owned by MCA and not

▲ ***New sunflower hybrids outyield the current dominant variety 6946 DMR.***

▲ ***Sunflowers ready to be planted in Manitoba nurseries.***

American companies. Currently, the top-performing sunflower varieties are owned and developed in the USA. While MCA holds the ownership of the hybrids, when a cultivar is ready for commercial release, a tendering process will occur with the board of directors selecting the marketing company.

"There is definitely optimism since Manitoba wanted a long-term breeding program where they can have access to good hybrids without having to worry about losing the hybrids," says Hagen of MCA's ownership of the breeding program. "The program is turning the corner and is at a stage where a high percentage of first- and second-year experimental hybrids possess all six of the traits considered necessary for potential commercialization."

Agronomically, data shows new cultivars will perform better, as well, with acceptable height and greater lodging resistance. Hagen's lines are also being selected on a basis of seed colour, an important check for certain confectionary buyers.

With a rebound in numbers this past year in both seeded acres and production, sunflowers may continue to rise in the coming years.

Now in Year 9 of the program, MCA is on a normal trajectory of a 10- to 12-year cycle to bring a new commercially viable hybrid to market. However, the goal is that it will not be just one. Hagen is hopeful at least two viable hybrids will emerge as strong candidates for pre-commercial advancements.

GENETIC GAINS

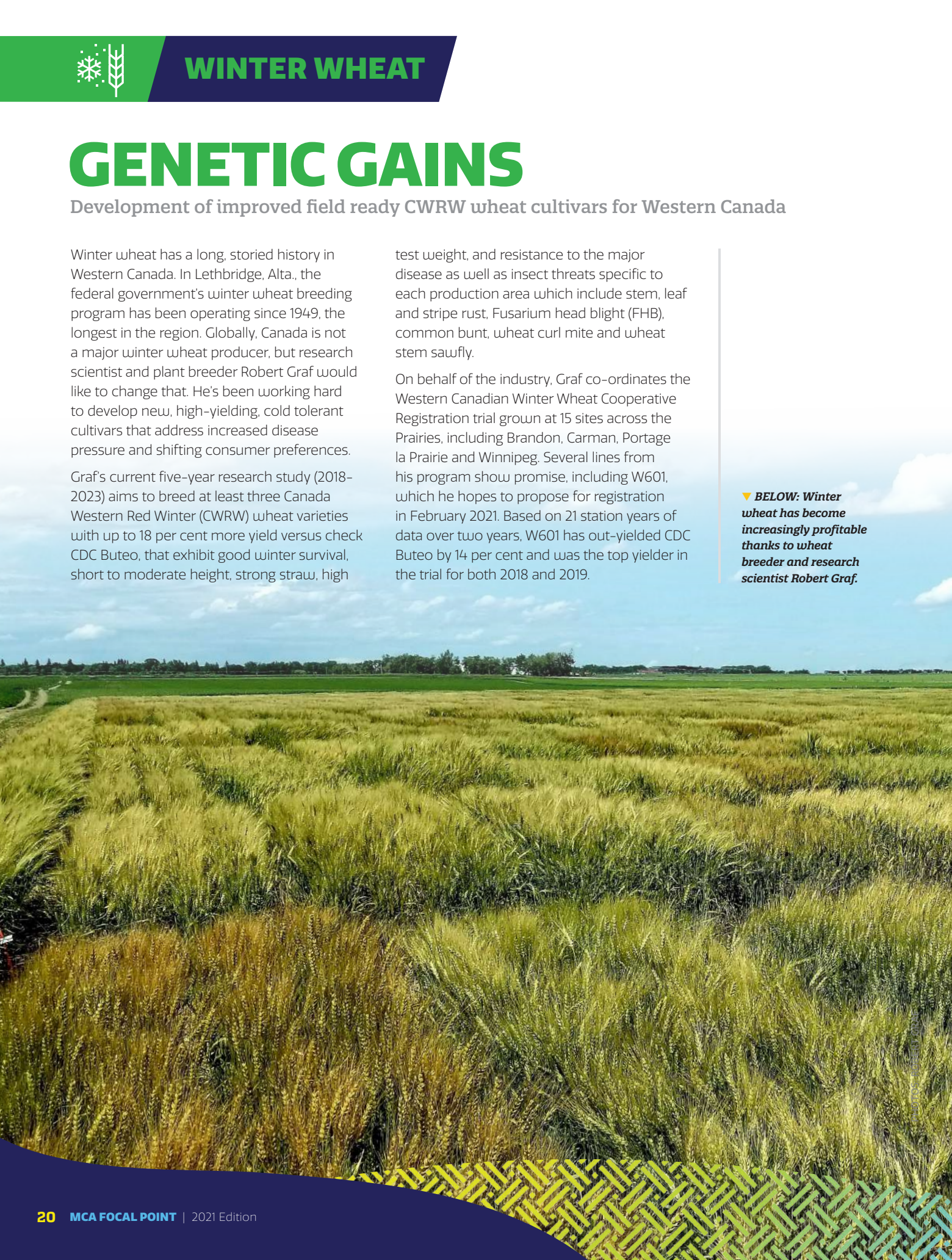
Development of improved field ready CWRW wheat cultivars for Western Canada

Winter wheat has a long, storied history in Western Canada. In Lethbridge, Alta., the federal government's winter wheat breeding program has been operating since 1949, the longest in the region. Globally, Canada is not a major winter wheat producer, but research scientist and plant breeder Robert Graf would like to change that. He's been working hard to develop new, high-yielding, cold tolerant cultivars that address increased disease pressure and shifting consumer preferences.

Graf's current five-year research study (2018-2023) aims to breed at least three Canada Western Red Winter (CWRW) wheat varieties with up to 18 per cent more yield versus check CDC Buteo, that exhibit good winter survival, short to moderate height, strong straw, high test weight, and resistance to the major disease as well as insect threats specific to each production area which include stem, leaf and stripe rust, Fusarium head blight (FHB), common bunt, wheat curl mite and wheat stem sawfly.

On behalf of the industry, Graf co-ordinates the Western Canadian Winter Wheat Cooperative Registration trial grown at 15 sites across the Prairies, including Brandon, Carman, Portage la Prairie and Winnipeg. Several lines from his program show promise, including W601, which he hopes to propose for registration in February 2021. Based on 21 station years of data over two years, W601 has out-yielded CDC Buteo by 14 per cent and was the top yielder in the trial for both 2018 and 2019.

▼ ***BELOW: Winter wheat has become increasingly profitable thanks to wheat breeder and research scientist Robert Graf.***



Lead Researcher:

Robert Graf

Research Scientist, Agriculture and Agri-Food Canada

Researcher bio: Dr. Robert Graf is a wheat breeder at the Lethbridge Research and Development Centre. His program focuses on developing improved winter wheat cultivars for Western Canada that combine superior yield, agronomics, and disease/pest resistance with end-use quality profiles to meet demands of traditional and emerging markets.

Collaborators: Reem Aboukhaddour, Anita Brule-Babel, Brian Beres, Richard Cuthbert, Tom Fetch, Gavin Humphreys, Santosh Kumar, André Laroche, Brent McCallum, Ramona Mohr, Harpinder Randhawa and Yuefeng Ruan

In addition, W601 has excellent winter survival, is relatively short, and has improved lodging resistance. W601's disease package includes resistance to stem, leaf and stripe rust, and intermediate resistance to FHB.

In February 2020, another line from Graf's program, W583, was recommended for registration, with marketing rights secured by Alliance Seeds. Overall, it outperformed all of the CWRW checks, had excellent survival, short strong straw, high protein concentration, and excellent resistance to stem, leaf and stripe rust. The reaction to FHB was rated as moderately resistant. Compared to Emerson, which is currently the most popular winter wheat in the eastern Prairies, W583 yielded about six per cent higher, was a day earlier maturing, and three centimetres shorter. Graf expected W583 to be fully registered before the end of the year.

"W583 is the first variety from my program that could be considered a replacement or alternative for Emerson in the eastern Prairies," says Graf. "We've been using Emerson and other germplasm lines for quite some time to enhance its disease resistance as well as improve the agronomic performance at the same time."

Graf says that three additional lines, W604, W614 and W616, are also showing great promise for Manitoba farmers.

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▲ ***ABOVE: Winter wheat varieties in Robert Graf's program are now yielding as much as certain CWRS varieties. This has made growing the fall-seeded crop an attractive option for Manitoba farmers.***

ON YOUR FARM

Farmers running out of reasons to deny winter wheat

Winter wheat is done playing second fiddle to spring wheat. The fall-seeded cereal has continued to make genetic advances that help close the gap in both profitability as well as many key agronomic, disease and end-use quality parameters.

Always faced with the challenge of adoption from farmers across the Prairies, the reasons continue to shrink as to why a farmer would not grow winter wheat in Manitoba. With Graf's breeding program showing certain new lines yielding 10-plus per cent higher than current winter wheat varieties, with excellent survival, shorter straw, enhanced disease resistance, and higher protein concentration, it's clear winter wheat development is surging ahead. Often grown to be blended off with CWRS, winter wheat research is showing that its horizon may be to become a primary option for farmers.

"We have lines currently in the Western Canadian Winter Wheat co-op registration trials that look extremely promising," says Graf. "These lines are not registered yet, but what we're seeing shows that we're moving in the right direction to meet the goals of this and other projects."

Winter cereals have long been known to have various environmental benefits. By anchoring the soil early on in fall, farmers do themselves a favour come spring where nitrogen may be recaptured by fall-seeded wheat as well as runoff water.

Pest resistance has also become much stronger over the past decade. Varieties from Graf's program have resistance to the rusts and FHB that are comparable or better than that of spring wheat. In addition, winter wheat escapes threats like the orange blossom wheat midge and wheat stem sawfly. In Manitoba, where Fusarium is a fact of life, growing a resistant winter wheat provides disease escape as an additional mitigation factor that complements genetic resistance and fungicide application.

Other, more difficult-to-quantify factors must also be considered, though they differ from farm to farm. By seeding winter wheat, the crop naturally outcompetes many weeds, which will reduce a farmer's herbicide input. Other costs, such as fuel and even the equipment itself all must be measured since there will be less time spent in the field while still achieving results.

Taller winter wheat varieties are also becoming a thing of the past thanks to Graf's research. With rare exception, all varieties he intends to put forward for farmers will be of a short to moderate height, to eliminate issues of straw management and optimize combine capacity.

With many varieties in the pipeline that are poised to make an impact for Manitoba farmers, there will soon be greater choice to grow profitable winter wheat that has contains all the agronomic benefits of spring wheat yet able to generate favourable financial returns.

W83, left, and W601, right, under irrigation. These two lines are some of Graf's highest-yielding winter wheat lines. Both lines also carry increased disease resistance packages.

MAXIMIZED SPACE

Rotational effects and optimized plant spatial arrangement for wheat production in Manitoba

With seed an ever-costlier input for farmers, maximizing value for ideal density is an important variable that has not received much study or recognition in the past. Provincial recommendations for density are at least 25 years old and suggest 246 to 300 plants per metre square (plants/m^2). Row spacing guidelines do not exist. Existing research speaks about density, but there is nothing about row spacing. Select scientific literature from the U.S. and Europe generally reference that not all wheat varieties respond the same to density and spacing recommendations. It's for this reason that Rob Gulden decided to look at both factors as influences on wheat production in the province.

Gulden's project lasted four years (2016-2020) and focused on two well-known CWRS varieties, AAC Brandon and Cardale, which yield 70 and 68 bu/ac, respectively. Both varieties are 101 days to maturity with comparable disease packages, including MR ratings to Fusarium head blight.

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Lead Researcher:

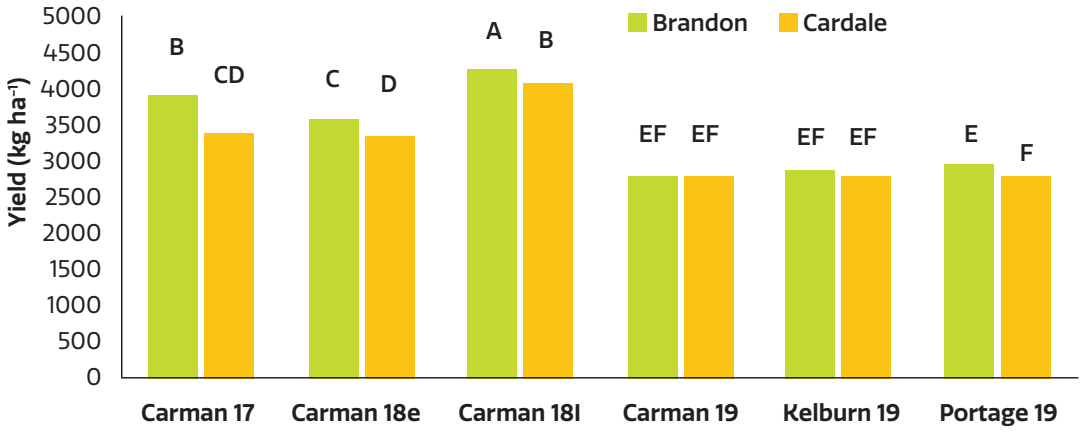
Robert Gulden

Professor of Plant Science, University of Manitoba

Researcher bio: Rob Gulden joined the University of Manitoba in 2007. His lab investigates weed and crop ecology and management. He grew up on family farms in Europe and Manitoba and received his post-graduate education at the universities of Manitoba, Saskatchewan and Guelph. Gulden's areas of expertise include agronomy, applied crop and weed ecology and biostatistics.

Collaborators: Manitoba Crop Diversification Centre at Portage la Prairie and Richardson International's Kelburn Farm

GRAPH A | SITE PERFORMANCE



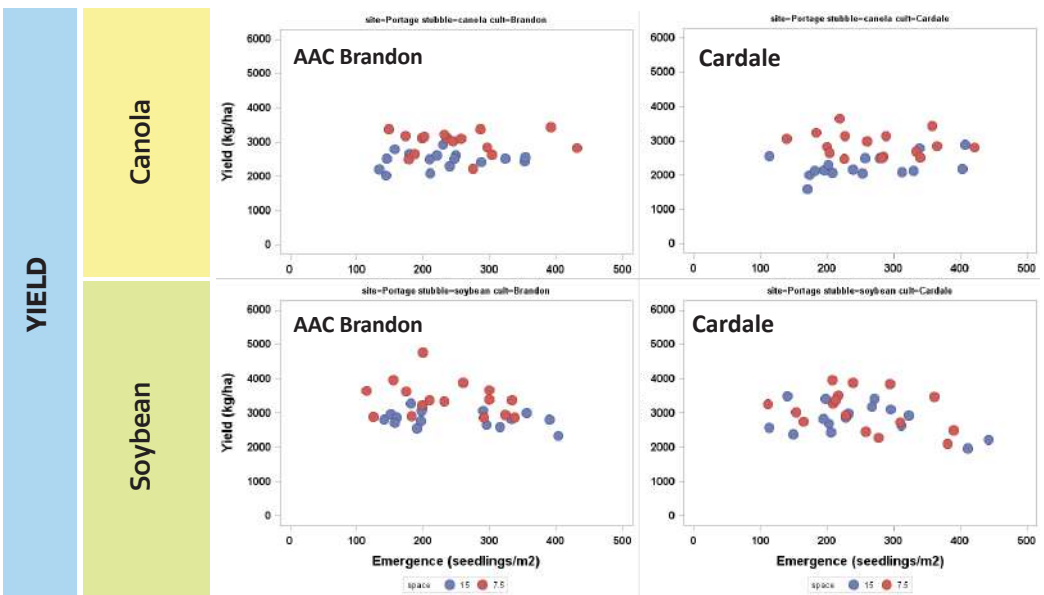
The research below details findings for the first three years, which occurred at Carman (2017-19), Kelburn (2019) and Portage la Prairie (2018-19). All six site years experienced drought conditions.

Gulden tested three different spacings: 3.75-inch, 7.5-inch and 15-inch. In addition, each variety was seeded at 200, 300, 400 or 500 seeds per metre square (seeds/m^2) into either canola or soybean stubble. He was interested to know if the plant density would affect the crop's overall canopy, weed competitiveness and general yield based on spacing.

At every site year, AAC Brandon equalled or outperformed Cardale (*Graph A*).

It was clear, overall, both varieties produced the best at 7.5-inch row spacing every time. Cardale had optimum results between 200 and 400 seeds/m^2 (*Graph B*) while AAC Brandon performed best on 400-500 seeds/m^2 (*Graph B*). Stubble type did not always affect the results, but when it did both cultivars yielded better on soybean stubble. Gulden says the difference, at most, has been no more than a few hundred kilograms per hectare, about 10 per cent. At 3.75-inch spacing, row closure occurred, on average.

GRAPH B | VARIETY PERFORMANCE AND YIELD



ON YOUR FARM

Multiple benefits from density, spacing results for farmers

Manitoba farmers have plenty of reasons to be pleased with ongoing research aimed to drive the most efficient returns on investment for both row spacing and seeding densities.

Research by Rob Gulden shows 7.5-inch row spacing is optimal as compared to 15-inch, encouraging news for farmers. For one, it demonstrates that the 7.5-inch row spacing means less room for weeds to emerge due to how fast the canopy closes post-emergence. Row closure is delayed or may not achieve 100 per cent on wider spacing. From a competition standpoint, mare rapid row closure is a positive for the wheat plants.

In addition, the density curve of Gulden's research is fairly flat, meaning there is no detriment for farmers to increase seed rates as a possible option to alleviate weed issues, such as wild oat. Certain wild oat populations now have no Group 1 or 2 herbicide options, so the increased rates are a natural convention to fight against weeds and delay herbicide application for as long as possible to maintain efficacy of limited available chemistries.

On 15-inch row spacing, farmers may face common weed issues such as green fox tail, which won't be able to compete well with a large second flush during the growing season. And while a late flush of green foxtail may have little impact on yield, it could spell issues in subsequent years if the weed seed bank has time to replenish itself. Similarly, increased plant densities offer some yield protection against grasshoppers, cutworms or other abiotic and biological stressors.

Research also demonstrates that in the 7.5-inch spacing there appears to be virtually no issues with lodging, either. So, while plant stands are becoming more robust, current varieties continue to perform well enough when it comes to fighting lodging at 7.5-inch and even 15-inch intervals.

Such research will be able to make more informed choices regarding seed drills, as well. With provincial research on this subject only emerging, farmers have to make educated guesses and what ideal seeding equipment may look like for them, specifically with row spacing.

"'Narrower is better' certainly seems to be the truth in terms of maximizing yield per unit acre," says Gulden.

By giving plants a more balanced, informed start in the month of May, it has the possibility to give farmers greater crop uniformity for improved harvestability and decreases general anxiety farmers may face throughout the growing season.

"A well-established crop can do a lot for itself. Taking some of that risk and worry away right from the get-go and minimizing that, it is good from a whole suite of perspectives, including producers' mental health and their stress loads."

▼ *New research on Fusarium risk modelling will help Manitoba farmers know if they should spray a fungicide prior to flowering.*

PHOTO: SACHITHRANI KANNANGARA, M.SC. STUDENT, UNIVERSITY OF MANITOBA

WEATHER WARNING

Development of a risk model for Fusarium head blight to improve cereal quality and yield in Canada

With the virulence of Fusarium and its many forms fully entrenched across the Prairies, research continues to focus on ways to give farmers timely information to fight the disease. The most notorious type is Fusarium head blight (FHB) as primarily infects small grain cereals which causes yield loss and downgrades due to mycotoxin production.

Through the work of Paul Bullock, professor at the University of Manitoba, more tools are on the way.

Now, in year three of a five-year research project, Bullock's research will conclude in 2023. The project has a few key goals including an understanding of the optimum weather conditions for Fusarium to thrive in cereals. By knowing that, a farmer can determine if the risk of Fusarium infection is high and if it is worthwhile to apply a fungicide at the flowering stage for disease suppression.

At 15 sites between northern Alberta to south of Winnipeg, plots have been established each with 10 different cereal varieties, including three winter wheat, three spring wheat, three barley

Lead Researcher:

Paul Bullock

Professor, Department of Soil Science, University of Manitoba

Researcher bio: Paul Bullock teaches and does research on a range of topics in agrometeorology including modeling weather impacts on crops, assessment of weather-based production risk and soil moisture modeling and measurement techniques.

Collaborators: Raul Avila, Greg Daniels, Dilantha Fernando, Mike Harding, Sachithrani Kannangara, Taurai Matengu, Manasah Mkhabela, Abbot Oghenekaro, Timi Ojo, Rejean Picard and Barb Ziesman

and one durum wheat. There is a range in Fusarium susceptibility across the 10 varieties including resistant–moderately resistant, intermediate and susceptible–moderately susceptible. Portable "watchdog" weather stations set up alongside the plots at each site monitor hourly changes in the weather conditions including air temperature, humidity, precipitation, wind speed and solar radiation. The FHB levels in each plot are assessed visually approximately three weeks post-flowering to determine an FHB index. Upon reaching maturity, they are harvested and the grain is sent to a lab for grading and testing for Fusarium-damaged kernels (FDK) as well as mycotoxins, including deoxynivalenol (DON), or vomitoxin.

Plot data are utilized in a logistic regression analysis to determine which weather variables are the best predictors for a high FHB index, FDK and DON. As more data are collected in each year of the project, the models are updated to capture a larger number of site-years and improve their accuracy and robustness.

The other field component of the FHB project has three summer students working within the provincial Prairie agriculture departments to connect directly with farmers and take observations and samples from selected fields of wheat, durum and barley. Data collected from the fields will be used to independently test the accuracy of the FHB risk models developed from the plot study. The target is to collect these data from 120 farmer fields in each of the three project field seasons to ensure model accuracy.

With preliminary models in development, the next phase of the project is underway to build an online viewer that will provide FHB risk assessments across the Prairies to farmers and others in the agriculture industry.

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▼ ***Paul Bullock says that many farmers spray a fungicide as a preventative measure for Fusarium but that it may not be needed once his research is finalized and turned into a website farmers can visit and learn from.***

PHOTO: TAURAI MATENGU, M.SC. STUDENT, UNIVERSITY OF MANITOBA

ON YOUR FARM

Weather data to inform spraying decisions like never before

Each year weather systems continue to improve with increasing sophistication. Accurate, real time weather data from progressively more station offer the ability to determine variation in crop disease risk over shorter distances and at higher spatial resolution. This can bring weather-based risk assessments closer to providing useful information at a farm scale.

One of the key battles on any Canadian farm, including Manitoba, is that of Fusarium head blight (FHB). The fungal disease has no true solution in cereals and requires an integrated management approach. Yield losses and downgrading from FHB cause major headaches for farmers who may have little choice but to accept potentially steep discounts if their cereals contain high amounts of Fusarium-damaged kernels (FDK) or mycotoxins, including deoxynivalenol (DON), or vomitoxin. (Estimates of the economic impacts from FHB range between $50 million and $300 million in losses annually across Canada.)

Because of current research such as Bullock's, farmers will soon have access to a greater pantheon of weather data through his FHB risk mapping research, which will give them a vital window of time to decide whether they should apply a fungicide at flowering. Often, farmers spray as a preventative measure, but that can cause other issues. Since FHB cannot be completely controlled, farmers simply spray to reduce its severity. Spraying unnecessarily increases risk for environmental damage and may cause issues with disease resistance, which is worrisome due to a lack of chemistries available for Fusarium control in cereals.

Bullock suggests that even in Manitoba, fungicide application is not necessary every year, but many farmers are not comfortable leaving their fields to chance.

"Manitoba has higher levels of fungal diseases due to higher humidity and farmers tend to apply fungicides no questions asked," he says. "Yet, there are years in Manitoba, even with its generally favourable climate for fungal growth, that fungicide application is not needed."

The flip side to this situation occurs in western Saskatchewan and Alberta where FHB is neither as widespread nor as common. Farmers in those areas rarely utilize fungicides for FHB suppression. However, there are growing seasons when FHB is quite prevalent, even in the western Prairies. These areas could benefit from fungicide application to have lower levels of FDK and DON in cereals. FHB risk models can inform them when this would pay off.

Within the scope of the research project, the plan calls for development of a website that farmers may use to access information on FHB risk. A beta version is expected to be ready for initial testing in 2022. Further research both to improve FHB risk model accuracy and develop its information dissemination are beyond the scope of this specific project, but hopefully the system will prove to be sufficiently valuable to warrant further investment.

FIELD-SCALE RESEARCH

On-farm trials continue to grow in popularity among Manitoba growers

▲ *Planting 10-inch row spacing corn for a seeding rate trial.*

Small-scale plot style research is critical to screen large amount of production practices in a short amount of time. It's tireless work that continues to give Manitoba agriculture great data for farmers to make informed decisions. However, farmers often prefer results that more closely resemble real growing conditions in their field. It's for this reason that the Manitoba Crop Alliance (MCA) and its on-farm network trials continues to gain in popularity and favour with the province's farmers.

The MCA has been investing in this work since 2016—corn trials began in 2017—and took inspiration from the Manitoba Pulse and Soybean Growers, which conducts similar programs.

The entire focus of the on-farm network trials is to give farmers the ability to establish field-scale trials on their own farm, tailored to their equipment. Where small-scale plots may be no more than a few acres, on-farm trials are typically 20 to 40 acres depending on the width of the farmer's machinery and as long as their particular field. The trials offer similar conditions that more closely mirror farming practices.

Initially the new project had an annual commitment of $39,000 from MCA. Today, however, that number sits at $100,000, a testament to MCA's commitment to farmer success.

Project Lead:

MANITOBA CROP ALLIANCE

Collaborators: Elizabeth Karpinchick from Tone Ag Consulting, (top) Mallorie Lewarne (middle) and Morgan Cott (bottom)

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▲ ***Applying a foliar biological trial on wheat.***

Above all, the project aims to give farmers the ability to trial agronomic practices in a variety of nuanced settings with different chemistries to help them determine where the practices will best fit within their current crop rotation. Currently, cereals are a priority to keep them a competitive option for farmers so they are not lost in rotational shuffles due to increasing soybean and canola acres. In addition, 11 corn seeding rate trials were set up in 2020. The question about corn seeding rates were driven by farmer interest, with some farmers pushing seeding rates up to 45,000 seeds per acre.

When a farmer chooses to participate in the trials, they receive many in season benefits. Support is provided at setup, with fields being monitored for different agronomic factors like plant stands, ground cover, pest pressure depending on the type of trial. Once all trials conclude provincewide, data is aggregated and put into a report. All farmers who were involved receive advance copies of the report to review all the other trial results.

"That's the beauty of being part of the on-farm network—if you do one trial, you have access to all of these trials," says Elizabeth Karpinchick, CCA, P. Ag, and agronomist at Tone Ag Consulting, the third-party company that works with MCA and its farm-scale research. "It's all being used to make publicly available tools better."

Farmers are not working alone, either. Once they come to MCA staff and signify interest, staff collaborate with them to design a research trial protocol specifically for them. Staff then help the farmer at seeding, spraying and harvest times to make it seamless as possible. Typically, the tests max out at three different factors, a standard treatment and two alternates.

In 2020, there were 35 farmers participating in five different projects, including trials related to plant growth regulators, seed treatments, malting barley, biologicals and a Fusarium head blight (FHB) timing project. Due to heavy potential of FHB this year, farmers who participated received very valuable data sets

> ***"That's the beauty of being part of the on-farm network—if you do one trial, you have access to all of these trials"***
>
> *— Elizabeth Karpinchick*
> *CCA, P. AG, AGRONOMIST, TONE AG CONSULTING*

not only at their own farm, but the additional participating farms.

Each year, MCA looks to add more farmers to its network and works alongside Tone Ag to achieve this.

Both groups locate farmers, prioritize overlapping farmer feedback and present recommendations to the MCA farmer-led board of directors who then vote on which projects to sponsor.

Seed, crop protection products and anything else that may be needed is delivered to the farm, minimizing the time a farmer must invest in order to get results. The trial is set up as a randomized block to ensure quality and give more robust results to the farmer. By harvest, staff are helping to harvest the crop and its data, including quality samples, moisture content, protein, general quality of wheat, falling number and certain baking characteristics. Information such as test weight and yield recalculated thanks to in-depth aerial coverage which can locate low spots and drown outs. For the current malting barley trial, the barley is being brewed in pilot batches by the Canadian Malting Barley Technical Centre in Winnipeg. Such information is later used to update international malt buyers interested in Canadian barley.

"Until you do the trial it seems a lot harder than it is," says Karpinchick. "By the end, though, farmers always tell us that it was worth it."

Trials have showed results that are giving real world agronomic changes. For instance, recent trials involved soybean inoculant. Robust data sets help demonstrate that once farmers build up enough inoculum in the soil, farmers can scale back on inoculant products without sacrificing production.

Crossover research is shared with the Manitoba government, such as Fusarium fungicide timing trials where results will later be rolled into the province's Fusarium risk map. By leveraging farmer dollars to a greater extent, this ultimately provides more agronomic results to farmers and creates a stronger suite of best management practices to make increasingly sophisticated agronomic choices.

MCA staff visit farm trial sites throughout the growing year and talk to the farmer connected to it about what they see, as well.

▲ ***Harvest at a wheat PGR Trial.***

FARMGATE PROFITABILITY

Research development continues to be Manitoba Crop Alliance's #1 focus

Summary:

Did you know Manitoba Crop Alliance has numerous strategic research areas? They are focused on issues farmer members have identified as challenges and opportunities requiring research to find answers and solutions. Moving into 2020/21 and beyond, MCA's research program will focus on a number of these issues, including: variety and hybrid development, management of diseases such as Fusarium head blight, Goss's Wilt, and sclerotinia, nitrogen management, impact of rotation on crop production, crop residue management, stand establishment including seeding rates and row spacings, weed control measures, support of third-party variety and hybrid evaluation trials including Manitoba Corn Committee, Manitoba Crop Variety Evaluation Team and Sunflower Variety Performance Trials; and, tools to manage moisture extremes and harvest management.

Lead:

Lori-Ann Kaminski

Research program manager, Manitoba Crop Alliance

Lead bio: Lori-Ann grew up on a grain farm in eastern Saskatchewan and received her bachelor of science in agriculture from the University of Saskatchewan. Lori-Ann has worked since graduation in research and research administration positions. She and husband David live in Carman, Man., where they raised their three children.

Nitrogen timing for modern high-yielding corn hybrids.

Summary of ongoing/ upcoming projects that Manitoba Crop Alliance is funding and involved in

Crop research continues to be the top priority for the Manitoba Crop Alliance in 2020-21. This crop year, our annual research commitment carries on the recent trend of steady, predictable funding for important agronomic work designed to make farmers more profitable and sustainable.

This year, as we commit $2.3 million for Manitoban farmers, we successfully strive toward our goal to spend 65 per cent of our budget on annual research allocation. We strive to focus on research that will lower the costs of production through yield gains and agronomic efficiencies. In doing so, we hope to enhance desirable market quality characteristics for our members to generate greater farmgate profitability.

Over the lifetime of the 79 current projects MCA sponsors, we will have proudly pledged $11.7 million on projects that have a combined value of more than $121.7 million. These active research projects relate to barley or wheat (70), corn (six), flaxseed (two) and sunflower (one).

With more than 40 active partners across these important projects, including Agriculture and Agri-Food Canada, the Manitoba government, the University of Manitoba and countless other co-operators, MCA has been able to leverage farmer dollars like never before. It is estimated that for every dollar an MCA farmer contributes through their levy payments, it becomes a 1:10 ratio. This has allowed us to sponsor important research that is beneficial to farmers for both crop marketing and agronomics.

The MCA's research program has taken time to become established, we have worked hard to be moving at the pace of industry. Today, MCA has variety development agreements in place for barley, corn, sunflower and spring and winter wheat.

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▲ ***Sunflower variety trials.***

◀ ***Wheat variety development line in a growth chamber ready for genetic screening.***

▲ ***Fusarium head blight management; barley FHB disease screening nursery at the AAFC Brandon Research & Development Centre with researcher James Tucker.***

▲ ***Nitrogen management of spring wheat in Manitoba.***

▲ ***PhD student Amy Mangin talking nitrogen and plant growth regulators for high-yield wheat.***

As research program manager Lori-Ann Kaminski explains, the funding that is in place today is going to help Manitoba farmers of today, but also those active for years to come.

"We are focused on core research programs that will give farmers tangible results," she says. "More than 90 per cent of what we focus on is applied research because we feel that is where we are able to generate the best value for our farmer members."

Manitoba Crop Alliance consists of four crop committees (wheat/barley, corn, flax, sunflower). These crop committees are commodity focused and develop research priorities for each of the crop types based on grassroots farmers' feedback. The crop committees review and recommend research projects and on-farm research trials to the MCA board of directors for funding. A cross-commodity committee will be formed to review funding for "whole farm" research, as MCA adds that priority area under our amalgamated organization.

For more information on MCA's research program, visit mbcropalliance.ca.

RESEARCH FACTS

DID YOU KNOW?

Manitoba Crop Alliance has numerous strategic research areas for 2020-21 and beyond:

- Variety development/ genetic enhancement
- Fusarium head blight management
- Nitrogen and protein
- Extremes of moisture initiative
- Rotation considerations, facilitate the development of agronomic innovations
- Residue management
- Stand establishment
- Population, and row spacing research
- On-farm research, support of variety evaluation trials

In 2020-2021, MCA will commit

$2.3 Million

on behalf of **Manitoban farmers** for research, we successfully strive toward our goal to spend

65% of our budget on annual research allocation

Over the lifetime of the **79 current projects** MCA sponsors, we will have proudly pledged

$11.7 Million

on projects that have a combined value of more than

$121.7 Million

Active research projects:

70	Barley or Wheat
6	Corn
2	Flaxseed
1	Sunflower

MCA currently works with

40

active partners to co-fund research

For every dollar an MCA farmer contributes through their levy payments, that dollar is leveraged at a 1:10 ratio

MANITOBA CROP ALLIANCE

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