MANITOBA Pulse Soybean GROWERS

pulse beat

Issue 94 • Fall/Winter 2021

PM40016070

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Manitoba Pulse & Soybean Growers thanks the authors who have taken the time to contribute to this publication.

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Member information is collected and used in accordance with the Personal Information Protection and Electronic Documents Act (PIPEDA) and is the property of Manitoba Pulse & Soybean Growers (MPSG). Information will not be shared, sold or viewed by any individual or group outside of MPSG unless directly related to member communications.

Please direct your comments or concerns to Sandy Robinson at 204.745.6488 or email sandy@manitobapulse.ca

In This Issue

Manitoba Pulse & Soybean Growers 2021 Board of Directors and Staff

ELECTED FARMER DIRECTORS

Chair – Calvin Penner – *Elm Creek*
Vice Chair – Melvin Rattai – *Beausejour*
Alex Burgess – *Minnedosa**
Bryce MacMillan – *Marquette*
Ben Martens – *Boissevain*
Brendan Phillips – *Hartney*
Bryce Pallister – *Portage la Prairie*
John Preun – *St. Andrews*
Frank Prince – *Waskada*
Garrett Sawatzky – *Altona*
Ernie Sirski – *Dauphin*

*Director Intern – Non-voting position

STAFF

Executive Director – Daryl Domitruk – *daryl@manitobapulse.ca*

Director of Finance and Administration – Melissa Denys-Roulette – *melissa@manitobapulse.ca*

Finance and Member Relations Administrator – Sandy Robinson – *sandy@manitobapulse.ca*

Research and Check-off Administrator Wendy Voogt – *wendy@manitobapulse.ca*

Production Specialist – East – Cassandra Tkachuk – *cassandra@manitobapulse.ca*

Production Specialist – West – Laura Schmidt – *laura@manitobapulse.ca*

Agronomist – On-Farm Network – Megan Bourns – *megan@manitobapulse.ca*

On-Farm Network Technician – Ian Kirby – *ian@manitobapulse.ca*

Message from Board Chair

"The glass is half full and the first half was delicious."

Calvin Penner, Chair, MPSG

IT HAS BEEN an interesting year for farmers, to say the very least. Soybean and pulse crop yields have been extremely variable across the province. I have heard reports from farmers ranging from two to 40-plus bushel-per-acre soybean yields. And all of these reports came from inside a 25-mile radius of my farm. There were farms that didn't receive any rain all year to farms that got very timely rains in July, giving them excellent yields. Overall, though, my prediction is that average yields across Manitoba will be very low for the 2021 growing season.

Being the eternal optimists that farmers are, we are already planning for next year. It's what we do — always looking forward.

There are many questions that will only be answered in the next year once we know what kinds of moisture/conditions we're dealing with: where is the ideal location to plant pulses? How did the nitrogen carry over from the previous year? How much nitrogen is too much? Will excess nitrogen affect nodulation? Will excess nitrogen cause issues with iron chlorosis in soybeans? Am I throwing away nitrogen if I want to plant nitrogen-fixing crops on fields with higher than normal nitrogen levels? All of these are important bits of information that need to be considered in planning a crop rotation.

Fortunately, there is research being done to address many of these questions. Manitoba Pulse & Soybean Growers (MPSG) has researchers not only with answers that come straight from the laboratory but MPSG can also answer these questions by drawing from its vast small-plot and On-Farm Network research. This cumulative repository of many years of boots-on-the-ground and eyes-on-many-fields experience serves MPSG's members well.

All of this data can be accessed on the MPSG website; manitobapulse.ca. If you need more information, feel free to contact a member of our research and production team. Some of this year's data still needs to be collected and analyzed, but it will be posted to the MPSG website as it becomes available, so keep checking.

It is still uncertain how many in-person meetings we will be able to hold this winter, so stay tuned. Ag Days has been scheduled for January. CropConnect is planned for February, but the conference will have a smaller attendance limit than it has in the past.

As I write this, it's Thanksgiving at my house. By the time you read this, I know that it will have come and gone, but I would still like to encourage you to take stock and be thankful for what you have and not dwell on what could have been. It is good to have an outlook of being thankful in life. A few years ago, while travelling in New Zealand, I saw a billboard, the words on which have resonated with me ever since: "The glass is half full and the first half was delicious."

I also stopped in at an agricultural fair and picked up a business card that had an outline of a dog's head on it and the lettering across the top said: "When Life's a Bit*h — Down? Tired? Stressed? Anxious?" There were phone numbers for various helplines.

Mental health is an important issue worldwide, and farmers have been told to suck it up or tough it out by themselves. We don't have to. There are people who can help. If you are suffering, don't be ashamed and please reach to friends, family and groups like the Manitoba Farm, Rural & Northern Support Services (www.supportline.ca) for help.

Let's look out for ourselves and our neighbours if we see that they are struggling.

Stay safe and try to keep perspective on what is truly important. ■

— Calvin

Field Pea Scout

Weevils, Weevils Everywhere!

Which of these is a yield-limiting pest of peas and faba beans?

Answers can be found on page 50

*Not to scale

Message from Executive Director

Daryl Domitruk, Executive Director, MPSG

I AM PLEASED to report neither drought nor pandemic could prevent Manitoba Pulse & Soybean Growers (MPSG) from accomplishing another successful field season. The efforts of our agronomists backed up by our dedicated office staff helped keep member services on par with previous years. In fact, the drought revealed so many unusual aspects of pulse and soybean growth we were busier than ever recording and assessing the range of crop responses. 2021 will be seen as the year of learning new things. All told, MPSG staff walked about 210 fields across the province. The support and interest we received from members was fantastic.

In our many conversations with media, we've remarked how yields in 2021 met expectations on the low end but exceeded expectations on the high end. Soybeans especially proved to be more resilient than we first imagined. At least, more responsive than we anticipated to the smallest amount of rain during pod fill. The rain came too late for many dry bean crops. Peas seemed to be hit hardest, which is ironic because they are a go-to crop when it's dry.

One very interesting set of late-fall observations was the high amount of residual N in many soils. Information on the anticipated effect on next season's annual legume productivity will be extended throughout the winter.

STAFF UPDATE

Megan Bourns, our On-Farm Network Agronomist, is departing MPSG (and departing Canada) to undertake a PhD at Kansas State University. In the three seasons Megan has piloted the On-Farm Network, she added immensely to the scope and efficiency of on-farm testing in Manitoba. Her approach to communications and grower engagement set the tone for our future plans to extend on-farm test results to members. There's no question the ag research community will be hearing a lot from Megan in the future.

Toban Dyck isn't going anywhere, but we've adjusted his responsibilities, nonetheless. Toban has relinquished his duties as overall communications director to focus on editing *Pulse Beat* and helping MPSG connect with growers. He is doing so under contract with MPSG. The rest of Toban's time will be spent farming, providing consulting services and freelance writing. It's great to see his stock rise with some national publications and consultancies.

IMPROVEMENTS WITH CHECK-OFF ADMINISTRATION

Check-off refunds are a reality of this business. Improvements initiated by our administration group this year are already paying dividends in a more efficient and cost-effective refund process. New software is adding tracking capabilities and the move to direct deposit has almost eliminated the cost of physical cheques.

PUBLICATION SCHEDULE CHANGE

Pulse Beat has been at the centre of MPSG's outreach program since Day One. It remains so even though the mediums through which farmers receive information have expanded. It takes a lot to produce *Pulse Beat*, including much staff time.

We've tasked staff to spend more time in fields and talking with farmers across the province. More time in the field puts the squeeze on time in the writer's chair. So, we've made the decision to substitute the June edition of *Pulse Beat* with a communication to growers that is easier and less costly to produce at that time of year. And, frankly, one that is more likely to be looked at by growers after a hectic seeding and spraying season. Members can also look for us to be experimenting with *The Science Edition* concept. The nitty-gritty of where most check-off dollars go — research — is great fodder for creative approaches to extension.

MIXED MEDIA MEETINGS

It appears the February annual general meeting will be a hybrid affair in keeping with the anticipated restrictions on crowd size at CropConnect. As it sits, members can join the AGM in-person or via a virtual link. Stay tuned.

Overall, the pandemic move to remote meetings has had a silver lining. As we became better at meeting virtually, the cost of committee meetings fell substantially. As well, online meetings had to be shorter, so they became structured to make more efficient use of directors' time.

Nevertheless, we are taking advantage of pandemic rules that enable limited

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in-person meetings and hope to hold board meetings again in person. To operate effectively in a virtual or hybrid setting, we must acquire skills in mixed media conversations. It seems worth the effort, pandemic or not.

POLICY BRIEF

In the last issue, I described how MPSG is approaching policy work. It's a certainty that farmers must do more to independently develop and articulate coherent policy positions. However, farmers also have another job. These days governments and other influential entities need help in understanding contemporary farming practices. Moreover, they need guidance as to how broader socio-economic priorities factor (or not) into choices made by farmers as they go about their business. Farm organizations' new role has become to mentor decision-makers; help them navigate their way through what, for most, is the unfamiliar territory of farming practice.

Climate change has taken us into a critical time of policy formation. Those tasked with developing mitigation and adaptation strategies must be drawn away from using foodie pop culture as a source of inspiration. Meaningful solutions will be both practical for farmers and effective against emissions. Not one or the other. This is tough and will take time. Mentoring of decision-makers can't happen fast enough.

Fortunately, Pulse Canada is developing meaningful and defendable climate change options that have enough practical credibility they just might gain traction on the farm. Read about these in this magazine. The strength of Pulse Canada's approach is that it places the farm in the context of a business. The right choices made by independent farm business people will take us forward. The right choices require the emergence of practical climate options — the kind MPSG and its partners are pursuing.

GOVERNMENT PROGRAMS AND FUNDING

Ag groups across Canada are also occupied with ensuring the next round of five-year government programs are up to the challenges of contemporary farming. The new program is slated to begin in April 2023. Groups in Manitoba are united in placing research at the top of the list (business risk management programs have their own list). Independently, MPSG has cautioned the province to avoid overloading the next program with expectations. While the list of needs has grown with the big issues facing farming, a corresponding increase in government funding isn't on the table. So, instead of loading up the program with pay-to-play services, governments should rebuild their internal capacity to support the sector in key day-to-day areas and leave the five-year programs to advance strategic goals only.

CONCLUSION

The fourth quarter of 2021 feels a bit strange. It's an unusual mixture of relief, trepidation, hope and anxiety. For the crops sector, the drought was bad but could have been worse. People are again out and about, sort of. Farm shows are on, sort of. The economy is rebounding, sort of. Fertilizer is really expensive, for sure. Much of our immediate future hangs on the effects of La Niña, maritime ship operators and China. Hopefully, there's wisdom that comes to an organization that embraces the challenges of instability and seeks to thrive. ■

— Daryl

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MANITOBA Pulse Soybean GROWERS

Notice of 2022 Annual General Meeting

NOTICE IS HEREBY GIVEN that a hybrid (in-person and virtual) meeting of the members of Manitoba Pulse & Soybean Growers (MPSG) will be held during the CropConnect Conference.

February 16, 2022 | 8:00 AM

Victoria Inn Hotel and Convention Centre
1808 Wellington Crescent • Winnipeg, MB

• **in-person or virtual option to attend** • details will be posted to **manitobapulse.ca** and MPSG's social media channels.

The purpose of the meeting is to:

1 approve the minutes of the 2021 members meeting
2 receive the financial statements of MPSG for the current fiscal year
3 appoint the auditor of MPSG
4 receive the board chair and executive director's report
5 elect directors to the MPSG Board of Directors
6 approve resolutions

Registration opens **December 13, 2021** | Register at **cropconnectconference.ca**

Call for Director Nominations

THREE POSITIONS ARE UP FOR ELECTION

*Each position holds a three-year term.**

Manitoba Pulse & Soybean Grower board members play a key role in making decisions affecting the direction of the pulse and soybean industry in our province.

BECOME A VOICE FOR MANITOBA'S PULSE AND SOYBEAN FARMERS

**Candidates must be a member in good standing with MPSG.*

For information contact

NOMINATING COMMITTEE

- **Brendan Phillips, Chair – grandbendfarms@gmail.com**
- **Ben Martens – bmarten1@mymts.net**
- **Bryce Pallister – bryce@pallister.com**

The 2022 Board of Directors Nomination Package is available at **manitobapulse.ca** or by contacting **sandy@manitobapulse.ca**

MANITOBA Pulse Soybean GROWERS

NOMINATION DEADLINE – JANUARY 27, 2022

Elections will be held during MPSG's AGM on February 16, 2022.

Manitoba Pulse & Soybean Growers 2021 Committees and Representatives

MPSG COMMITTEES – *The first named is chair*

Executive – C. Penner, M. Rattai, B. Phillips

Governance/HR – B. MacMillan, F. Prince

Policy – B. Phillips, B. Martens, B. Pallister, J. Preun, M. Rattai, E. Sirski

Finance/Audit – M. Rattai, J. Preun

Resolutions – B. Phillips, B. Martens, B. Pallister

Nominating – B. Phillips, B. Martens, B. Pallister

Communications/Member Relations – E. Sirski, B. MacMillan, B. Pallister, G. Sawatzky

Market Development – J. Preun, B. Martens, B. Pallister, A. Burgess (non-voting)

Research – F. Prince, B. Martens, B. Pallister, B. Phillips, M. Rattai, G. Sawatzky, A. Burgess (non-voting)

U of M Research Agronomist Advisory Committee – F. Prince, J. Preun

MPSG REPRESENTATIVES

Canadian Grain Commission Pulse Sub-Committee – G. Sawatzky

Grain Growers of Canada – B. Phillips
- **Trade and Marketing** – E. Sirski
- **Business Risk Management** – TBD

Keystone Agricultural Producers
- **General Council** – C. Penner
- **Pulse/Oilseed Sub-Committee** – Staff
- **Commodity Group** – C. Penner

MCVET – Staff

PGDC/PRCPSC – B. Martens, staff

Pulse Canada – B. Martens, J. Preun
- **Sustainability** – F. Prince

Soy Canada – E. Sirski, M. Rattai

Western Canadian Pulse Growers Association
- **WGRF** – B. Dalgarno (MPSG) (term 2019–2023)
- **CGC Western Grain Standards Committee** – E. Sirski (exp. 2021)

OUR MISSION

To provide research, production knowledge and market development support to Manitoba pulse and soybean farmers.

Clancey's Stats

North American pulse production is down sharply from last year

Brian Clancey, Senior Market Analyst and Publisher, STAT Communications

ACCORDING TO THE most recent production estimates from Statistics Canada and the U.S. Department of Agriculture (USDA), North American pulse production is down sharply from last year. Combined output in the two countries has fallen from 11.9 to 7.05 million metric tonnes (MT). Some market participants expect further reductions in the official estimates when the final numbers are released in December and January.

The declines were partially offset by an increase in ending stocks in the two countries. Those rose from 1.18 to 1.62 million MT. Even so, the available supply sank from 13.09 to 8.67 million MT, well below the recent five-year average of 11.93 million.

The most dramatic change was in the number of peas and lentils grown this year. Lentil production sank from 3.86 to 2.36 million MT, while peas dropped from 5.58 to 3.09 million. While white bean output in Canada and the U.S. dropped from 463,000 to 349,000 MT, coloured bean output will fall more sharply from 1.6 million MT last year to an estimated 1.07 million this year.

Dry bean output by class was not broken in the U.S., but given the impact of drought on yields in North Dakota, it seems likely the pinto bean harvest has fallen from 635,200 to 327,100 MT. Black bean output is also down, dropping from almost 304,500 MT to an estimated 242,300; while navy bean output is expected to drop from 205,100 to 171,200 MT.

What is interesting is that while Canada will need to reduce exports of peas and lentils, it is not facing a fundamental shortage relative to the needs of the domestic market. That is not the case in the U.S. The country is looking at fundamental shortages of pinto beans, peas, chickpeas and possibly lentils.

EXPORTS TO THE U.S. SHOULD RISE

Manitoba is the leading producer of pinto beans in Canada. This year's seeded area was initially estimated at 55,600 acres, down from 88,300 last year. The total area

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in Canada was estimated at 90,000 acres, compared to 97,300 last year. It may not be possible to get an accurate number for pinto bean area until crop insurance data is available. Not all farmers insure their crops, but that data helps get closer to reality. Given estimated coloured bean production in Manitoba, it may be that the province's pinto bean harvest has dropped from around 96,000 MT to 57,200.

During the 2020–21 marketing year, Canada exported almost 61,400 MT of pinto beans, with roughly 7,800 going to the U.S. The previous marketing year, pinto bean exports 47,200 MT, with over 8,700 going to the U.S. Movement south of the border was higher in 2019–20 because available supplies of pinto beans were down in that country; while more abundant supplies in 2020–21 contributed to reduced buying interest in Canadian product.

Like all net exporting countries, Canada faces serious logistical problems shipping pulses outside North America. Ocean freight rates are unusually high and container availability is a constant problem. Combined with a short U.S. crop, this ought to see movement into that country increase because it is easier to move beans by truck or rail.

Peas should see a similar change in demand patterns. Available supplies of all classes of peas in the U.S. have dropped from 1.326 million MT to almost 840,000. This suggests total exports by that country will drop from 448,000 to 318,000 MT, while the quantity consumed by the domestic market may sink from 560,000 to 345,000 MT unless the U.S. exports less product and imports more peas from Canada.

Manitoba's pea harvest is currently estimated at 182,800 MT, down from 246,200 last year. Total production in Canada has plunged from 4.59 to 2.53 million MT. Counting the carryover from last season, available pea supplies in Canada total 3.09 million MT, down from 4.91 million in 2020–21.

Canada has no choice but to reduce total exports. The biggest decline is expected with China, with shipments to all countries in Asia expected to sink from 3.22 to 1.62 million MT. By contrast, movement to the U.S. and Mexico could jump from 172,000 to 456,000 MT, with most going to the U.S.

THE FRACTIONATION FACTOR

The North American domestic market has changed considerably in the past few years. Years ago, peas only found their way in supermarket bulk bins, packages and soups. Now, they are used to manufacture protein and starch fractions and as ingredients in vegetarian pet foods. Those sectors have added a ton of demand to North American domestic markets, helped by recent increases in the number of fractionation plants.

That industry ought to be happy with this year's harvest. Initial analysis by the Canadian Grain Commission suggests the average protein content of the Canadian crop increased from 23.1% last year to 25%. Initial samples submitted by farmers indicate the average for Manitoba is 24.8%, up from 22.7% last season.

Growers across western Canada ought to see solid demand in our domestic market and excellent opportunities to move product in the U.S., whether directly or through processors and exporters.

The implication is pricing for yellow peas could be well supported through the coming months as domestic buyers try to cover their needs and importers in other countries try to fill in gaps in their supplies. This has already seen average bids for yellow peas rise to a modest premium over green.

Farmers in North Dakota and Montana have moved away from green peas toward yellow because of the influence of the fractionation industry. But this year's drought more than offset the acreage gains, with the result yellow pea output in North Dakota may have dropped from 214,000 to 157,000 MT and in Montana from 247,000 to 150,000.

Given all the sources of competing demand for what they grew, it is easy to imagine that the fractionation industry in the U.S. will need to look to Canada to fill in supply gaps. This year's higher average protein content could help attract buyers from that sector. Some companies pay protein premiums, improving the gross returns per acre for farmers.

One thing to always bear in mind is that while the trend is a friend, waiting endlessly for higher prices is going to run into two negative factors at some point in 2022—buyer resistance outside North America and expectations of much lower prices after next year's harvest.

If soil moisture conditions do not improve over the winter, all bets are off over how many peas will be planted and what kind of yields should be expected. However, it is not hard to imagine that a bullish year for peas will encourage expansion outside North America and increased competition for available demand in 2022–23. Never forget the old warning—the best cure for high prices is high prices because it encourages farmers to plant more. ■

NORTH AMERICAN PULSE PRODUCTION SUMMARY

Area (acres)	2017	2018	2019	2020	2021
Canada	363,100	363,300	395,300	457,200	373,500
United States	1,514,400	1,269,300	1,339,100	1,821,500	1,462,500
Total	1,877,500	1,632,600	1,734,400	2,278,700	1,836,000
Production (MT)					
Canada					
• Coloured	259,700	273,400	239,200	345,000	249,000
• White	94,700	93,600	88,700	144,800	102,500
Total	354,400	367,000	327,900	489,800	351,500
United States					
• Pinto	635,997	415,346	322,494	635,202	327,133
• Black	233,607	238,437	229,830	304,476	242,308
• Navy	188,742	189,903	135,260	205,098	171,242
• Great Northern	63,640	54,002	46,584	85,051	53,830
• Other	236,142	274,656	249,161	340,865	270,525
Total	1,358,127	1,172,344	983,330	1,570,692	1,065,038
Total Production	1,712,527	1,539,344	1,311,230	2,060,492	1,416,538
Opening Stocks	223,000	374,000	369,000	188,000	507,000
Total Supply	1,935,527	1,913,344	1,680,230	2,248,492	1,923,538
Rolling Average	1,828,446	1,823,709	1,863,649	1,834,436	1,895,782

BASED on data from USDA, Statistics Canada and STAT Publishing.

Manitoba Farmers Poised to Play Role in Soybean Success Story

Brian Innes, Executive Director, Soy Canada

Introducing Soy Canada's new Executive Director, Brian Innes

In May of this year, **Brian Innes** joined Soy Canada as its Executive Director, replacing Ron Davidson. In his role as Executive Director, he leads the organization's efforts to create value through collaboration in the areas of industry leadership, market access, market development as well as coordinating research and innovation.

Prior to joining Soy Canada, he led the Canola Council's public affairs activities, including communications, government relations, market access and trade policy. During his time at the Council, he spearheaded the expansion of the *Keep it Clean* program to include multiple commodities, led the development of the industry's market access strategy, led efforts to resolve market access issues and was active to help the agri-food sector achieve benefits from free-trade negotiations through the Canadian Agri-food Trade Alliance.

Brian has also served as a senior consultant with the Ottawa office of an international public affairs firm working with food, agri-business, healthcare and mining clients. In this role, he helped manage food safety risk communication and helped clients achieve their legislative, regulatory and reputational goals with government officials and politicians. Brian also worked on Parliament Hill for the Parliamentary Secretary for the Minister of National Defence and an Industry Critic.

I'M EXCITED TO continue working for you in my new role as Executive Director of Soy Canada.

Since joining the organization earlier this year, I'm excited for how we're going to build our soybean industry from our strong foundation. But before describing how we're building a stronger soybean industry, let's take stock of what we've already got going for us.

We have a crop that's an important part of the rotation to maximize returns and manage risk, especially when we can't predict what the growing season will be like when the seed goes into the ground. We have a changing climate that favours crops like soybeans that can tolerate heat and moisture. In soybeans, we have a crop that produces the ideal protein for people and animals and is a source of healthy oil in a world that is demanding more and more healthy choices.

Most importantly, soybeans have what is required for a value-chain organization such as Soy Canada to deliver results. We have producer groups committed to working together, a long history of food-grade exporters coming together, seed companies committed to growth and value, as well as processors and exporters committed to working with their partners to get the most for the crop.

This is not to say the industry doesn't have a few challenges. But understanding what we need to succeed as a small portion of global supply on the fringes of the crop's adaptability helps us be laser-focused and deliver results.

With this foundation, and my excitement, you may wonder what we're doing together?

First, our greatest growth potential is our ability to grow more soybeans and get more value from the soybeans we already grow in western Canada. As a relative newcomer, I've noticed we've had some challenges achieving consistent protein levels. We've started on a path to increase protein and there's lots of research underway.

As a small player in the global market, being different can easily be seen as inferior, especially if we don't spend the time as a value chain to coordinate.

Soy Canada will be active in connecting the dots so that we align our supply chain

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Grain Growers of Canada Assesses the Lay of the (Political) Landscape

Erin Gowriluk, Executive Director, Grain Growers of Canada

AT FIRST GLANCE, the political landscape in Ottawa, post-election, does not appear much different than it did a few months ago. Yet, a renewed Liberal minority government may operate differently this time around. This is largely due to the fact that it was clear no one wanted a pandemic election this summer, and it is hard to see a scenario where there would be much public appetite for another one in the near future. Combined with the reality that the political parties will need to restock their campaign war chests, it is tough to think the governing Liberals will have trouble finding support from one of the other opposition parties to move forward with their agenda.

What does this mean for farmers, though? It means that environmental policy will remain the focus for agriculture under this government. We need to continue to grapple with ensuring that MPs, Ministers and bureaucrats better understand the impacts of certain policy proposals in this space. Additionally, it means we will need to continue to engage with all political parties to ensure that our sector's priorities cannot be ignored.

During the lead-up to the federal election campaign, the Grain Growers of Canada (GGC) actively engaged with all of the main political parties to stress the core areas of agricultural policy that we wanted to see included in their respective election platforms. Our areas of focus included:

- Increased funding towards more effective risk-management programs
- Investing in agricultural research to better position grain growers for the future
- Refocus regulation to enable innovation and increase Canada's competitiveness
- Modernize the Canada Grain Act to reduce costs, maintain protection, and return excess service fees to farmers
- Break down trade barriers and aggressively defend Canada's exporters
- A Made-in-Canada approach to environmental policy that recognizes and rewards farmers for being part of the climate change solution

While all the party platforms lacked any real emphasis on agriculture, we will continue to focus on driving the needs of our sector forward. This starts in earnest as soon as the Prime Minister announces his cabinet, and Parliament returns this fall. While many questions remain as to whether we can expect in-person meetings during the remainder of this calendar year, at the time you are reading this, GGC hopes to have already held a slate of in-person meetings in mid-November with key MPs and Ministers. We are also hoping to engage in a larger lobby week in February 2022.

To be frank, it is an uphill battle. However, we will continue to raise issues that matter to Canadian farmers to all parties in Ottawa. After a difficult growing season for many producers, rising input costs and a volatile trade environment, it is more important than ever that we loudly stand up for the needs of Canada's grain growers — and that's just what we are going to do. ■

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with the value the customer sees, sharing information so that we're getting the most value possible from our crop. Our upcoming Northern Soybean Summit in January will be a key meeting point for our value chain to come together to share and tackle this challenge.

Second, we've got a world-leading food-grade business and we need to stay on top. To stay on top, we need to have a clear message about how our beans meet our customers' quality needs, including increasing questions about how we grow our beans sustainably. We can't rest on our laurels. We need to be active and organized to show our customers what they're getting when purchasing Canadian soybeans. As more new varieties adapted to Manitoba come to market, there's an increasing opportunity for Manitoba farmers to become part of this long-standing Canadian success story.

Third, we're going to be there when the soybean industry needs leadership. We will step up and bring together our value chain when there's an opportunity we can't grasp without multiple players. We will step up when there's a market-access issue for Canadian soybeans. We will step up when Canadian soybeans are challenged at home or abroad. One area you'll be hearing more from us on is how we better position our soybeans with customers who now see soybeans from other countries as more sustainable than Canadian soybeans.

The phrase "value chain" gets repeated a lot. With a short history and a diverse soybean industry across Canada, Soy Canada will be focused on what's valuable to our customers and working together to deliver those things. We'll be working together to manage the risks and seize the opportunity in our path.

And most importantly, collaboration with other agri-food organizations is an essential part of how we'll work for you. We recognize that almost all farmers grow more than one crop. The livelihoods of our seed companies, producers, exporters and processors depend on more than one oilseed.

I'm excited about the potential for soybeans in Canada. As such a young organization, our future is still being written. I'm excited to be part of it and look forward to creating value out of our supply chain. ■

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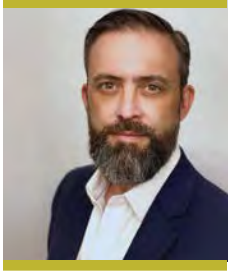
PULSE CANADA

New leadership at Pulse Canada, Greg Cherewyk



In March of this year, **Greg Cherewyk**, President of Pulse Canada (PC), took over as leader of the organization, replacing long-time CEO and first PC staff member Gordon Bacon. Greg has been with Pulse Canada for 17 years, most recently serving as president. In this role, Greg will also provide management services to the Canadian Special Crops Association (CSCA), which represents processors and exporters of pulses and special crops.

Canada's pulse industry is focused on diversifying revenue streams to drive value back throughout the supply chain. The current *25 by 2025* strategy aims to move 25%, or 2 million tonnes, of Canadian pulses into new uses and new markets by 2025. While new market opportunities are a priority, the organization is equally focused on maintaining Canada's position in its traditional markets. That means keeping markets open and dealing with barriers as they arise, as well as ensuring that the supply chains that service those markets are always reliable and fluid.

"We've got a bold new strategy and a lot of exciting work ahead of us that builds on the success that Gordon helped create. We're going to maintain that momentum and continue to forge a new path for pulses as the future of food," said Cherewyk.

Sustainability: A Key Differentiator for Canadian Pulse Growers

Jeff English, Vice President, Marketing and Communications, Pulse Canada

THE TOPICS OF sustainability and climate change have been at the forefront of national conversations for some time. And while pulse growers and the industry overall are able to take pride in the fact that pulse crops naturally help reduce carbon emissions, use less water than other sources of protein, and improve soil health, it is becoming increasingly clear that there is an opportunity to further expand global demand for Canadian pulses by identifying as a solution to meeting broader global climate targets.

Sustainability shed itself of being a trend long ago. Consumers are asking more questions about where their food comes from and how products are made, and companies are working not only to align themselves with consumer demands, but to get ahead of the curve. As these conversations trickle up to government and policymakers, Pulse Canada is working to ensure our industry's sustainability strategy evolves while ensuring value is brought back through the value chain right to the farm gate.

At Pulse Canada, we have two goals that drive our work on this file. Our sustainability initiatives work to:

- Create conditions for growers, processors and exporters to monetize commitments being made to global environmental sustainability; and
- Establish and solidify the Canadian pulse sector as a leader in providing food and ingredient solutions that decrease agriculture's impact on climate change, effectively strengthening our global reputation and brand.

Pulses and pulse ingredients are some of the most sustainable foods around due to their capacity to fix nitrogen, their water-use efficiency and their contribution to soil health. But because of the world-leading stewardship practices of our producers, Canadian pulses are a leader among sustainably grown crops. When it comes to addressing Canada's and our planet's climate goals, our sector could easily pat itself on the back and lean on the fact that pulse crops naturally leave the earth better than they found it. But not only is that mentality not aligned with the innovativeness of Canadian pulse growers, it would also leave dollars on the table.

As this conversation around sustainability grows, so should the expectation of Canadian pulse growers and the trade to realize and monetize the opportunity that exists for sustainably grown crops and ingredients that can transform diets and food products. So, rather than allowing decisions that impact our industry to be made for us, we're working with our members, the pulse industry, food companies, ingredient processors and governments to ensure we can collectively evolve Canadian pulse's sustainability story. For example, Pulse Canada is actively working to bring value to the pulse value chain by facilitating research that builds life cycle assessments for Canadian pulses. This work will position Canadian pulses as **the definition of sustainable food and ingredients** in the global food industry.

Our life cycle assessments for individual pulse crops are ongoing but are already proving their worth. A recent study in cooperation with the University of British Columbia created the first Canadian Life Cycle Assessment (LCA) for peas and lentils. This research confirmed that peas and lentils have a much lower carbon footprint than other crops and provided us with an objective, robust dataset to prove that story to companies here in Canada, across North America, and around the world. But more than that, this research holds up Canadian farmers' vision of modern agriculture as necessary to meeting consumer and company expectations on sustainability. It won't surprise growers that the main contributors to the life cycle environmental impacts of pea and lentil production were fertilizer and fuel use. With pulses' nitrogen-fixing capabilities, their contribution to emissions is naturally lower. And with growers' commitment to using the latest technologies and adoption of no-till, there

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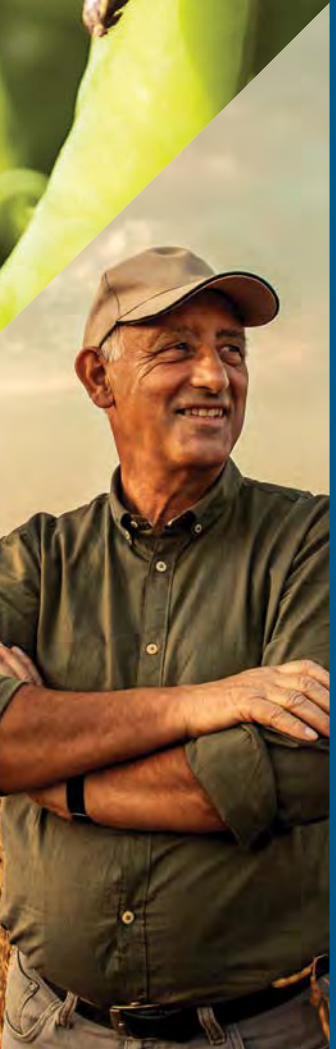
are fewer passes being made annually and less fuel use. This is translating not only into savings at the farm gate but a more sustainable end product.

Now this may seem like common sense, and to a point it is — but without the science to back it up, our industry was much like others — trying to quantify and substantiate sustainability in a crowded sea of marketing-driven claims. We are taking the guesswork out of the equation and will use the pea and lentil LCA to properly position pulse crops and pulse ingredients in the global marketplace, giving growers the credit they deserve while increasing demands and the return back to the farm gate. Recently, growers from Alberta, Saskatchewan, Manitoba and Ontario participated in a dry bean and faba bean LCA survey, and we are hopeful to see similar results.

In the same vein, in 2020, Pulse Canada commissioned a research project investigating the environmental impacts and benefits of including Canadian peas into animal feed rations for western Canadian pork and egg production. The punchline was that not only do peas lower the carbon footprint of the feed itself, but can reduce the greenhouse gas emissions of the final pork product by roughly 18%. While there is more work to do, there is tremendous potential provided we put this research into the hands of companies who are focused on meeting their sustainability targets. These findings will impact much of the work undertaken by the Pulse Canada team on members' behalf as we work toward the realization of the *25 by 2025* strategy — finding new, lucrative markets and new uses for Canadian pulses.

As consumers continue to demand more from their food and products, pulses and pulse ingredients will continue to be recognized as the most sustainable options. The Canadian pulse industry has the opportunity to showcase Canadian pulses as the leader in sustainability and to capitalize on an opportunity that benefits the grower, the consumer, the Canadian economy and the global climate. And at Pulse Canada, we will continue to work on behalf of pulse growers and the entire value chain to turn this opportunity into a reality. If you have any questions on any of Pulse Canada's work related to marketing the sustainability of Canadian pulses, please do not hesitate to contact me directly at jenglish@pulsecanada.com ■



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Anastasia Kubinec, Conventional Agronomist (204) 295-8013

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The Shipping Container Crunch and the Pulse Industry

What growers need to know

Delta Hirsch, Pulse Canada

NORTH AMERICA IS collectively struggling with availability of shipping containers to trade goods with global markets and Canadian pulse growers can expect to face some challenges in the coming year.

As the world fights for available containers, carriers are prioritizing sending empty containers to other markets that are willing to pay high dollars to get their goods out in a timely manner. Exporters in both Canada and the U.S. are struggling to maintain competitiveness when carriers aren't willing to wait for the containers to get filled with North American goods before sending them back across the globe.

Canada's reputation remains at risk and exporters face increasing logistical and financial issues as carriers continue to favour their profits over supporting the North American supply chain. Realizing the full revenue potential from the rising global pulse demand — in other words, getting the maximum value for pulse crops — will be tough should logistics costs arising from container supply chain disruptions continue to worsen. Pulse growers may also feel these effects through future grain-price reductions, as buyers adjust to account for unforeseen costs, delays and other supply chain disruptions. Furthermore, with a disrupted system, pulse growers are likely to face issues as buyers accommodate various logistical issues.

While both Canadian and U.S. exporters are facing similar challenges, the Biden administration is advocating for improving its national supply chain by recognizing this issue directly relates to the strength of the U.S. economy as a whole. The Canadian government, on the other hand, has remained mostly silent.

"It's like we're accepting that our competitiveness just erodes constantly," says Greg Northey, Vice President of Corporate Affairs at Pulse Canada. "We

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just bleed profitability and competitiveness if we continue to ignore the reliability and performance of our supply chains."

The initiatives in the U.S. are already underway, pressuring carriers to take accountability and treating the issue as an impact on their global competitiveness. In contrast, the Canadian government has maintained a passive attitude, taking little responsibility for an issue that jeopardizes both Canada's reputation and our economic recovery from the global pandemic.

After a tough year, maintaining Canada's global reputation as a reliable supplier of pulses is as important as ever. Over the last crop year, a multitude of issues affecting our grain supply chains have impacted our global perception — railway blockades, natural disasters impacting our rail infrastructure and causing unreliable railway performance and labour issues at port affecting output. Along with immense grower advocacy, Pulse Canada is continually working to push the federal government to step up on these issues and take more responsibility to ensure that transportation infrastructure remains a well-functioning backbone of Canada's economic strength.

A well-functioning transportation system and access to reliable and consistent container capacity are as important as ever. Global demand for Canadian pulses is expected to increase in the 2021–22 crop year.

"Currently, there is tremendous uncertainty about container capacity and logistics reliability for the upcoming crop year. So while we have this global demand, shippers can't meet it because containers aren't available," says Northey. "All this means there is significant potential that we don't capture all the opportunities from increased demand."

After requesting that the Minister of Transport take immediate action to hold carriers accountable for the shipping container availability, Pulse Canada has joined a consortium with other industries affected by this issue. The group recognizes this issue requires a Canada-wide effort and is working together on key solutions, including:

- Providing greater transparency and clarity into how the Canadian container supply chain is functioning within the context of a global container shortage;
- Identifying domestic legislative or competition law remedies to correct shipping line behaviour;
- Identifying any necessary changes to domestic legislation or competition law; and
- Engaging with global partners and authorities on the development of appropriate regulation of the shipping line sector.

Pulse Canada is also spearheading a public advocacy campaign — *Fix the #ContainerCrunch* — to communicate the impact the supply chain disruption is having on the Canadian pulse industry and the economy overall.

"The more groups that raise this issue and the more growers draw attention to this issue, the more success we will have getting government action," says Northey. "So much of our strength lies in our ability to advocate."

How can pulse growers navigate the container crunch and mitigate potential issues? Add your voice to help *Fix the #ContainerCrunch* by visiting www.containercrunch.ca to send a letter to the Minister of Transport. In addition, talk with your grain buyers early to understand the issues they're facing and what they're expecting from the transportation system. This will allow you to plan transportation and other logistics accordingly, mitigating potential delivery or financial delays.

"The more we work together as a supply chain, the less damage everyone will feel," advises Northey.

Pulse Canada continues to advocate for our growers, traders and processors, working to get the federal government to show some leadership. To stay up-to-date with Pulse Canada's efforts, follow @pulsecanada on Twitter and listen and subscribe to the weekly *Grain by Train* podcast. Visit pulsecanada.com to learn more. ■

Cassandra Tkachuk, Production Specialist – East

SCOUTING THE VARIETY TRIALS

In 2021, MPSG sponsored 29 herbicide-tolerant soybean, nine conventional soybean, eight dry bean variety evaluation trials (four wide-row and four narrow-row), and co-sponsored 10 field pea and two faba bean trials with MCVET. Overall, we saw testing of nearly 200 pulse and soybean varieties!

To ensure high-quality data collection, Laura and I work closely with Dennis Lange to visit the trials all over Manitoba in a timely fashion. We achieved our goal of two-plus visits per site – after crop establishment, prior to harvest and a time or two in between to look for anything that might influence data quality (e.g., uneven plant stands, weather anomalies, pest pressures, nutrient deficiencies). All the while, contractors keep a keen eye as they care for the trials. And as usual, we each took a site under our wings to collect intensive maturity ratings that bring you the *days to maturity* you see for each variety in the guide.

These trials are held to such a high standard that a site may be halted mid-season, or data may be rejected if specifications are not met. I'm happy to report that 2021 had a high success rate for trials! We are pleased to present this year's results in our *Pulse and Soybean Variety Guide.*

The Souris field pea site yielded, on average, 136 bu/ac!

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Producing Highly Functional Plant-Based Protein Starts on the Farm

Dan Kraft, VP of Operations, Merit Functional Foods

Merit's non-GMO yellow peas – fresh from the field!

Merit's grower partnerships are pivotal to producing highly functional pea and canola protein ingredients that help manufacturers unlock better plant-based products that deliver on taste, texture, and nutrition.

IN OCTOBER, AS the growing season was winding down, we were gearing up for our 2022 Merit contracting period with our partner, Pitura Seeds, who connected with growers to secure contracts for the following season. Many of our existing growers chose to continue their partnerships with us, and we are also pleased to welcome new farms to the Merit grower family.

We take pride in our proximity to an abundant source of yellow peas and non-GMO canola – which was a strategic decision made by our founders when determining where to build our production facility. This closeness to the source means we can provide high-quality, sustainable made-in-Canada plant protein solutions for manufacturers for use in products such as plant-based ice cream, meat and dairy alternatives, protein bars, and more.

At Merit, we use proprietary extraction and filtration technology to produce our high purity pea protein ingredients with pleasing flavour and smooth texture. The end products of this process are Peazazz® and Peazac® – two novel, highly soluble pea proteins ranging from 80% to 90% protein that addresses taste, texture, and flavour issues and many other problems common to plant protein ingredients.

We encourage growers to become part of our exciting story, and here are a few reasons why:

- **We are a Canadian Company** – Our founders are Manitobans who are passionate about supporting their local community and offering manufacturers options for Canadian grown and produced plant protein ingredients
- **Competitive Contracts** – We bring value to Canadian growers with competitive contracts for organic/non-organic yellow peas and non-GMO canola
- **True Partnership** – Along with our industry-leading contracting partner, Pitura Seeds, we collaborate with growers to build mutually beneficial long-term relationships
- **Consumer Appeal** – We produce sustainable protein ingredients to help manufacturers meet increasing consumer demand for allergen-friendly products
- **New Revenue Streams** – We produce the world's first high purity, non-GMO canola protein, which provides a new value-added revenue stream for growers in western Canada.

In addition to these benefits, growing with Merit has recently become more streamlined with the introduction of our new *Grower Pricing* portal. This site allows contracted growers to view our current non-GMO canola and pea contract prices and provides them with a user-friendly tool to help secure pricing for their specific delivery periods. The site also offers an easy way for potential growers to learn about the key features of our contracts.

We believe that everyone deserves plant protein with Merit – and our trusted growers are critical contributors to this mission. Together, we are bringing Canadian-grown protein to a world hungry for change!

Merit's Puratein® C canola protein reduces the rate of plant-based protein bar firming over shelf life.

For more information, please visit meritfoods.com/growers and connect with us on Twitter @MeritProteins to stay up to date on our grower news. ■

Delmar Commodities

Crushing it in Manitoba

Toban Dyck, Writer and Farmer

Crush a soybean and you're left with oil and a granular substance referred to as meal. Dale Heide has cooked with both, in their raw, unprocessed forms. He made cookies with the meal and used the oil in his deep fryer.

Dale, Director Business Lines, and his colleague Keith Friesen, Grain Merchandiser at Delmar Commodities, gave me a tour of their Jordan Mills soybean crush facility situated on the corner of Hwy 3 and Hwy 23.

Its current capacity is impressive, and it is set up and ready to increase in step with Manitoba's soybean acres.

If, like me, you've heard the phrase *soybean crush facility* often and if, like me, you'd like to know more about what's involved in running such a facility as well as what's involved in processing soybean into meal and oil, then read on. This article is for you.

This facility has particular significance to me. I see it every time I drive to Carman for work. I see it every time I drive to Winnipeg. I see it every time I drive north. I've even delivered soybeans to it (though, I think they were my dad's).

I know it well. So, when people say, "we're at Jordan corner," my wife and I know we only have about 10 minutes to prepare for their arrival. It's close to my farm.

"DELMAR COMMODITIES WAS started as a feed grain trading company over 20 years ago," said Dale. "Soon after it began operating, the need for a physical handling facility became apparent and the Jordan siding was purchased. In the following years, other grain handling facilities were added."

As soybean acres began to increase in Manitoba in the early 2000s, Delmar and some local partners put their heads together and found common ground in their determination that the trend to grow soys had staying power and that a crush facility would be viable and practical.

In 2002, Delmar constructed the Jordan Mills crush plant. It was a pioneering facility at the time and remains so today.

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Soy oil and soymeal for use in various livestock industries.

"It was at the time a much smaller facility than it is today, crushing just over 1,000 MT per month," said Dale. "As the acres in Manitoba grew, so did the mill. Today, Jordan Mills will purchase and crush over 100,000 MT of Manitoba soybeans, per year, with most of the meal and oil generated staying in the three prairie provinces. "

Delmar is quite active in the western Canadian soybean space and is a key character in the narrative surrounding the still burgeoning crop.

"Delmar's division, Ceres Global Seeds, grows and distributes the Sevita brand of soybeans," said Dale. "Delmar is a full-service company. We see ourselves as a cradle-to-grave operator, selecting the right soybeans for the various soybean-growing regions, having that seed grown and then selling those seeds through our own Delmar retail locations and other Sevita seed retailers. Then we buy that production back and turn those beans into high-quality soymeal and soy oil for use in the various livestock industries, locally. This is where we believe we can be a great partner with Manitoba Pulse & Soybean Growers (MPSG), as we cover many aspects of the soybean life cycle and have a vested interest in all portions."

At Jordan Mills, soybeans get processed into oil and meal (in an impressively short and efficient amount of time).

THE CRUSH PROCESS

"The beans are carefully binned according to milling characteristics and then conditioned to provide a very consistent feedstock for the mill process," explained Keith Friesen, Delmar's Grain Merchandiser. "Jordan Mills uses a mechanical extrusion process rather than the typical hexane extraction method. This process ruptures the plant cell walls making it possible to separate much of the oil.

In 2002, Delmar constructed the Jordan Mills crush plant. It was a pioneering facility at the time and remains so today.

"During this time, the product is heated to a specific temperature for a specific duration, neutralizing the potentially harmful characteristics of the raw bean and improving characteristics of both the meal and oil (flavour and protein digestibility of the meal, and extended shelf life of the oil). This product is then pressed to remove most of the oil and is then cooled and ground to a specific particle size based on our customer's requirements. The final meal product in a typical year is 42% protein and 7% fat, and, when compared to solvent meal, it contains much less moisture, provides superior flowability and creates much less dust.

"The oil that is removed is run through a series of steps to be classified as a crude degummed soybean oil. This product is in high demand, both from local livestock users as well as the rapidly growing renewable diesel industry. It has an extended shelf life and better cold-weather performance than other fat options.

"While mechanical extrusion does not allow full oil extraction, there are several positives that serve us well in Manitoba. Firstly, we can be efficient on a much smaller scale than a hexane plant. At 100,000 MT-plus per year, we feel we are well-positioned. Not too large as to require constant U.S. soybean imports, but large enough to be a leader in western Canada in regards to growing and expanding our soybean production and providing a needed reliable, convenient and local source of soybean meal for our livestock industry.

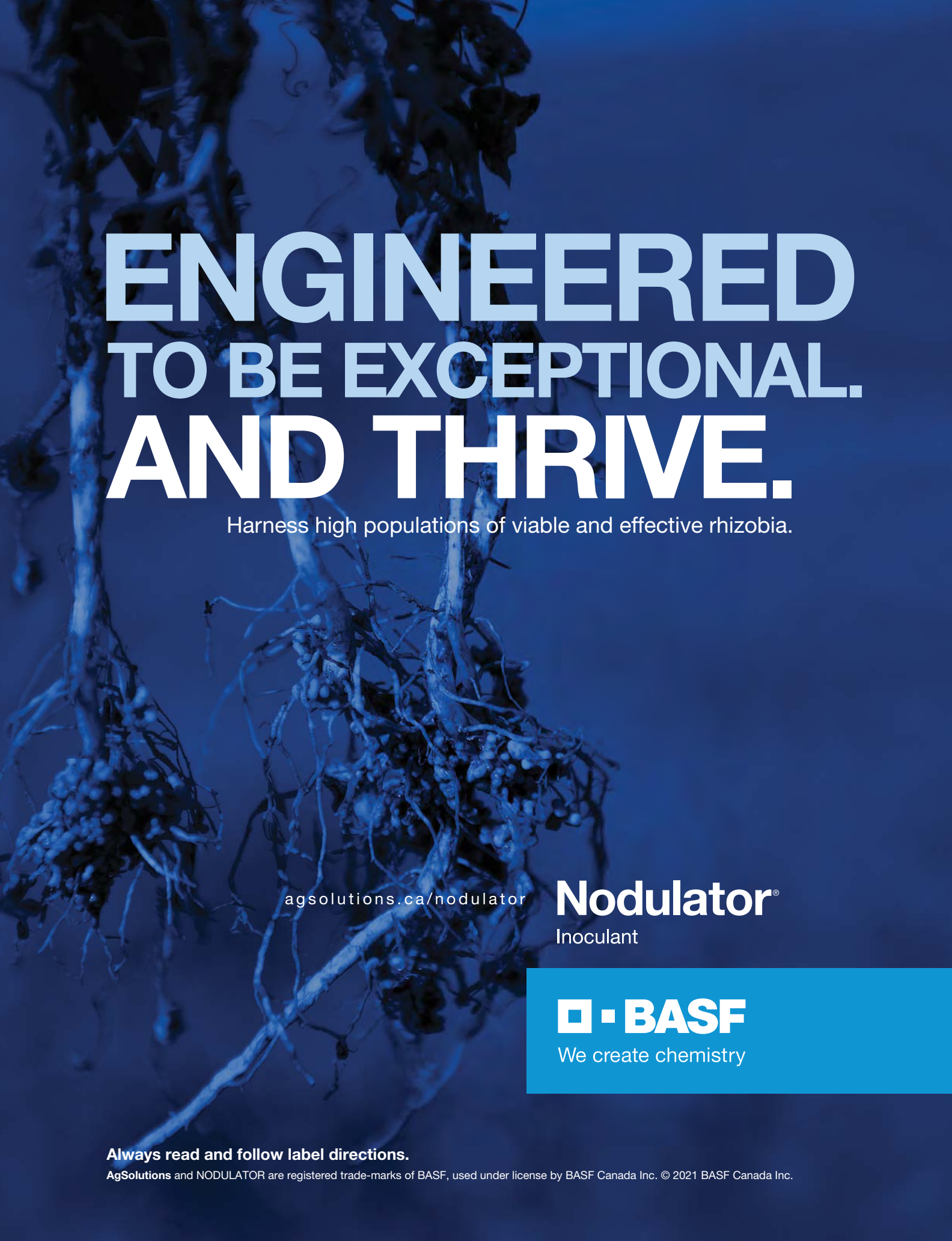
"Another benefit is that the meal that our extrusion process creates is unique, in that some of the oil is retained in the meal and allows our customers to fill two needs at once—protein and energy. As energy values climb, this factor becomes more and more significant."

THE MARKET

These products are primarily sold to the hog, poultry and dairy industries, each of which are highly concerned with quality and consistency. This is not an easy thing to guarantee. A poor growing year can result in soybean quality and quantity discrepancies. Delmar's process is agile and capable enough to maintain a high level of quality in the face of these unknowns.

"With nearly all our soybean crush supply coming from Manitoba's farmers, it is imperative to the success of our business that we maintain volume and quality of supply on an annual basis," said Dale. "There are advantages to crushing local beans and being able to provide a local meal and oil supply—reduced freight to import soymeal, less freight to export soybeans to markets outside the area. In the changing world of carbon footprints, locally manufactured goods keep jobs here and they are good for our long-term environmental goals. Delmar Commodities and Jordan Mills see opportunities to work with MPSG to advance genetics and farming practices and promote our Manitoba-made feed products.

"As we look forward to future growth, we are excited by the potential that we see." ■



Always read and follow label directions.

MPSG Sponsors Two New Classroom Resources


Photo: Ag in the Classroom–Manitoba

Learning about crops using an Ag in the Classroom seed kit.

TWO EXCITING NEW resources are in the works at Agriculture in the Classroom–Manitoba (AITC–M) this school year, both focused on educating kids about Manitoba commodities and their importance to our everyday lives.

"We are so grateful to have Manitoba Pulse & Soybean Growers (MPSG) on board as a foundational sponsor for the new *Manitoba Seed Kit* and the *Foundations of Manitoba Agriculture* resources," said Sue Clayton, Executive Director for AITC–M. "We are excited to be able to provide these long-anticipated resources to Manitoba teachers and students."

Year after year, AITC–M's number one requested resource by teachers is a seed kit. AITC–M is thrilled to be able to produce the *Manitoba Seed Kit* with the support of MPSG. They plan to create 700 kits, each containing the seeds of 15 Manitoba fibre, forage, food and feed crops, including soybeans, yellow peas and pinto beans. Students and teachers will learn to recognize the crops, where they are grown and processed in Manitoba, what they are used for and their economic importance.

The kits will be distributed and introduced to students by industry volunteers next March for Canadian Agriculture Literacy Month (CALM) during classroom visits as the featured resource. The kits that are connected to the grade 3–6 curriculum will stay in the classrooms and will be used year after year by teachers and students.

Educators also often tell the staff that even though AITC–M provides amazing classroom-ready resources and activities, they feel nervous teaching and answering questions about agriculture because they know very little about the topic. To address this concern, the *Foundations of Manitoba Agriculture* resource was born.

The *Foundations of Manitoba Agriculture* will be offered online and highlight all major crop and livestock commodities in Manitoba in three different formats to speak to educators and students across the grade K–12 audience. Pulse and soybean production in Manitoba will be featured as two of the major crop commodities in both long- and short-form summary sheets along with digital learning activities to promote a positive image of pulse and soybean production in the province.

The resource summaries will also focus on the history, health and nutrition, processing and technology and the vast career opportunities in the industry.

"We absolutely could not do all we do without the generous support of our members and sponsors like MPSG," said Clayton.

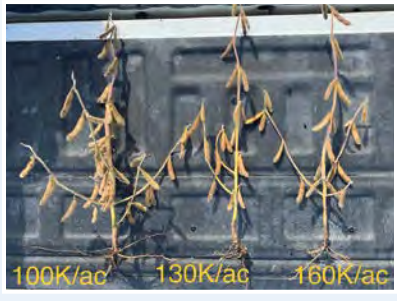
To volunteer, become an individual or corporate donor to AITC–M, or learn more about what we do, head to aitc.mb.ca. ■

Megan Bourns, Agronomist – On-Farm Network

MOISTURE MATTERED MOST

In a year where moisture mattered the most for yield outcomes, it can be frustrating for research. What's the point in asking research questions when it's so darn dry that not much will make a difference, especially for soybean yield? I get it. But, we still have the opportunity to learn. If we only asked research questions in years with optimal conditions, we'd have a pretty narrow view of the performance of our agronomic practices.

In contrast to the exciting yield responses in some of our dry bean trials this year (see page 36), soybean results were not much to write home about in terms of treatment differences. However, we made some interesting observations. For example, in a soybean seeding rate trial comparing rates of 100K, 130K and 160K seeds/ac, there were stark differences in plant architecture. Is it a more efficient use of resources to have more smaller plants per acre or fewer branched-out plants per acre? In this case, it made no difference in yield. And not just a lack of statistical differences, but almost no numerical differences as well, with three treatments yielding between 20 and 20.8 bu/ac. Interesting, isn't it? If, in a year where the efficiency of plant resource use should be paramount to crop success, there was essentially no difference in yield. Perhaps it matters more that there are pods and potential for seed fill, and less so how those pods and seeds are spatially arranged. This will be an interesting phenomenon to observe over time, in different growing-season conditions for different seeding rate trials!



Your Investment at Work

MANITOBA Pulse Soybean GROWERS

MPSG Expanding R&P Reporting to Farmers

Daryl Domitruk, PhD, PAg, Executive Director, MPSG

IN OUR CONSTANT effort to optimize the transfer of research results to farmers, MPSG will be expanding the breadth and depth of research reporting. An expanded suite of results from the On-Farm Network alone begs broader and deeper exposure. The usual videos, tweets, apps and special posts will be accompanied by a modified version of *Pulse Beat: The Science Edition* magazine. We're eager to see what can be done with the treasure of knowledge MPSG has accumulated.

Coming out of 2021, we are somewhat surprised by how normal the field activity numbers look. Of course, there was nothing normal about 2021. Behind the numbers are extensive efforts by MPSG staff and our research partners to keep the research ship righted when the forces of nature and human folly were trying to run it aground.

ON-FARM NETWORK PROGRAM

Results of the 2021 On-Farm Network program have been distributed to participants. General distribution will occur in early 2022. We are expending more effort on each trial and not necessarily pursuing more trials. This year we targeted 70 trials. Having reached that goal, drought pushed us back to 54 trials covering 16 topics. Most fungicide trials were abandoned for obvious reasons. A reminder that on-farm tests are easy to do on your own. MPSG staff are happy to advise on trial setup and data analysis.

REGIONAL VARIETY TESTING PROGRAM

The **regional variety testing** program continues to be one of our more successful and long-running programs. A total of 48 trials were conducted throughout Manitoba in 2021. Across those trials, a total of 196 varieties of soybeans (herbicide-tolerant and conventional), dry beans (narrow-row, wide-row, and all major classes), peas and faba beans were tested for yield and maturity. A new site near Holland worked great. Results are published in the MPSG *Pulse and Soybean Variety Guide* bundled with this issue of *Pulse Beat*, as well as in *Seed Manitoba*. We're continuing to assess protein content in soybean varieties grown in these trials, given the ongoing interest in protein levels. These results will be available online in February.

FIELD SURVEILLANCE

Field surveillance was especially interesting in 2021. Staff walked over 200 fields across the province. Of course, drought impacts were abundant and we learned a lot about crop responses to drought. Most of this information was distributed in-season via the *Bean Report*. While we again conducted surveys for crop disease this year, it proceeded a little quicker. Currently, our attention is focused on nipping the soybean cyst nematode in the bud. Surveillance is turning up more cases. We're planning a training session for agronomists and extension on preventative measures.

NEW RESEARCH PROGRAMS

Being in Manitoba means we're in a bit of a lull for new research projects. That's because the provincial matching program ends two seasons prior to the sunset of the Canadian Agricultural Partnership (CAP). We've asked the province to finally correct this gap because we're losing research to other provinces that run seamless programs. There was, however, a provincial funding competition for equipment and short turn-around projects. MPSG was awarded funds to purchase a near infrared (NIR) protein measuring device, which we will install at AAFC–Morden. Ten years ago, MPSG purchased a similar machine. The new NIRs main purpose is to study soybean protein and dry bean quality. Funding was also awarded to MPSG to assist in the design and building of an autonomous plot cart that will carry cameras to scan for genetic variants of soybean that display drought tolerance traits. This is in the emerging field of machine learning. Finally, we received funding to retain Prairie Agricultural Machinery Institute (PAMI) to conduct an analysis of opportunities to tighten up on greenhouse gas (GHG) emissions around the farm. Knowing the cost:benefit of various technologies (e-vehicles, low temperature grain drying, etc.) will help when we lobby for a return of carbon tax to pay for these improvements.

AGRONOMIST-IN RESIDENCE PROGRAM

The Agronomist-in-Residence program was slated to end, but we've extended the agreement with U of M for the program to continue until April 2023. Project results are rolling in and will be featured in the

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Pulse Beat: The Science Edition and other communication platforms for the next couple of years. Discussions are underway regarding the future of this program.

SCIENCE CLUSTER PROGRAM

Discussions with our sister pulse and soybean organizations are underway to prepare proposals for the next Science Cluster program expected to be part of the Next Policy Framework in 2023. Projects suited for the federally funded Science Cluster program tend to be more complex and require teams of researchers across Canada. We've been reserving research funds for the last few years in anticipation of committing about $1 million to science cluster projects. Top of mind is the improvement of drought tolerance in soybeans. We're connected with researchers at AAFC–Ottawa who have identified early maturing lines that maintain nitrogen fixation and, hence, yield and protein under drought (page 41). Since there is a gap in provincial funding, we will solely fund the testing of these lines in Manitoba before orchestrating a multi-year science cluster project.

Other projects currently on the shortlist for the next science cluster include root rot resistance in peas, beans and soybeans, coaxing dry beans to fix their own nitrogen and conservation tillage systems for dry beans and soybeans.

NATIONAL RESEARCH STRATEGY

By the time this magazine goes to print, pulse grower groups across Canada should have released a new national research strategy. The strategy seeks to emphasize topics that have gained prominence in the last five years, such as root rot, pesticide resistance and the contribution of pulses to Canada's climate change goals. The strategy will help us create interprovincial projects to improve yield and quality while reducing the cost of production. Manitoba is a natural to lead projects on dry beans.

While a decline in acres led to a smaller than anticipated research budget over the last few years, MPSG is holding its own and continuing a very successful run attracting funds from public and private sources. The Manitoba CAP program has been instrumental in this regard, and we are very appreciative of the government's contributions. It is critical government maintain and even increase funding programs going forward. ■

Unique Aspects of the 2021 Growing Season

The Bean Report
Your source for soybean and pulse crop agronomy and research.

Cassandra Tkachuk, Production Specialist – East, MPSG

SPRING

After a few dry years and another one anticipated, we saw less soil disturbance than ever in spring and it really did help soils retain moisture. Most farmers set out to plant early to access residual soil moisture out of fear that the taps might not turn on. Temperatures warmed up earlier than usual, tempting pea growers to plant in early April with some going for it in the second week. Heavier soils were more friable than ever and sandier soils were more fragile than ever. Rapidly drying topsoil forced farmers to push seed deep. And in some cases, the moisture line dropped below the furrow.

Delayed emergence, uneven plant stands and a wide range in plant development after emergence were common. Much of this stemmed from variable seed depth and reduced germination from the lack of moisture. Pulse and soybean crops in June had the widest variability in development that I have ever seen, with a spread of one to two development stages more than usual for each crop.

We had late spring frosts for two nights in a row on May 26–27 and May 27–28. The first night of frost impacted most of agro-Manitoba with temperatures ranging from -1°C to -8.9°C and remaining below zero for up to 11 hours. The northern Interlake region was hit the hardest. The second night was less severe by comparison (0°C to -4.9°C), hitting mainly the southern half of agro-Manitoba. Pockets in the east and west that had up to six hours of frost. Peas and faba beans were resilient to frost damage and dry beans hadn't emerged yet, but soybeans were starting to poke out of the ground and some damage was done. Thankfully emergence was incomplete, so some plants were still safely underground.

Figure 1. Young soybean plants snapped off by the wind near Manitou, re-growing from their axillary buds (inset) and the same field on August 24.

Heavy winds blew soil into furrows and crop residue into clusters, increasing seed depth and hindering emergence in some spots. One mid-June windstorm hit parts of the south-central region pretty hard. We discarded our wide-row dry bean variety evaluation trial at Winkler due to wind damage and edible bean plants were ripped from the ground in a commercial field nearby, reducing plant stand by 30%. The same storm tattered a large swath of soybeans at the west end of a field to the point that they looked like they were gone. But they were miraculously regrowing within the week and the field bounced back as if nothing ever happened (Figure 1).

SUMMER

July was a brutally hot month with 16 days above 30°C. These hot temperatures induced a lot of crop stress during critical developmental stages. Plants routinely flipped their leaves and closed their stomata, meaning less photosynthesis took place and plants were deprived of the sugars needed for growth and yield. Prolonged drought stress caused shorter plants with less leaf area (putting more into below-ground growth than above-ground), abscission of leaves, shortened vegetative and flowering periods, aborted flowers, pods and seeds, smaller seed size and early maturity. And sadly, drooping field pea plant tops at the end of June. Even peas that typically thrive in dry conditions have their limits.

Figure 2. Drooping field peas due to drought stress near Stonewall on June 29.

Rainfall systems were infrequent and selective. One area would get a nice soaking rain and huge sections of the province would get nothing. Many areas seemed to be operating on one good rain per month until August. Widespread, plentiful rains finally fell in mid-to-late August that benefitted R6 soybeans in Westman, but it was unfortunately, too late for the R7 soybeans in Eastman

There were reports of nodulation failure in soybeans and peas, likely caused by high residual nitrate levels detected across the province (more on page 47), inoculant failure, or in the odd case, root rot. Options were limited, but rescue nitrogen was recommended if there were also signs of N-deficiency and good yield potential of the crop. Interestingly, we saw several large soybean nodules reported by research to be more susceptible to drought. Symptoms of potassium (K) deficiency were also common in sandy fields and exacerbated toward the end of the season as pod demand for K increased.

Distinctive pest issues in 2021 included:

1. a newly-identified case of soybean cyst nematode in the R.M. of Thompson (making a total of five rural municipalities), but this time with visible cysts on the roots (more on page 39)
2. our first case of the famously herbicide resistant noxious weed, Palmer amaranth, found in a black bean field in the R.M. of Dufferin

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Photo: Kristen P. MacMillan

Figure 3. Green soybeans near Marquette with prolific bud and flower growth (inset) and a full field of green pinto beans near MacGregor on September 15.

Photo: Dennis Lange

3. pea leaf weevil confirmed at more locations further from the western edge of Manitoba (more on page 49)
4. lygus bug damage to edible bean seed at various locations across the province and
5. very low root, stem and foliar disease pressure except for fields with tight crop rotations.

FALL

In mid-September, there were a few unique reports of soybean plants remaining green. Fields had either the odd green plant, small patches or a large section of green toward the headlands, where the rest of the field was harvest-ready. In one case, plants had prolific growth of buds and flowers, especially in low spots. Affected plants had few to no pods and didn't have any hope of contributing to yield at that late date. There were also a couple of edible bean cases around the same time, where entire fields stayed green with reduced pod set. These issues appear to be strongly linked to drought conditions during flowering and the subsequent shift to better moisture in August that triggered regrowth. We still don't know exactly what was causing this, but we are considering the greenstem disorder and male sterility as potential causes (more on page 42) and we are investigating viruses.

Crop yields were highly variable and surprisingly great in some areas of the northeast, central and western regions. Soybean yields ranged from 15–45 bu/ac overall. There were lots of soys in the 30–40-bushel range, 15–20 bushels were from extremely dry, sandy soils and >35 bushels were a product of better rains and heavier soils. Pea yields ranged from 15–50 bu/ac with lots of fields in the low 40s. And across all market classes of edible beans, yields were mainly at 1,000–1,200 lbs/ac in moisture-limited areas, around 1,600+ lbs where moisture was better and ranged anywhere from 500–2,000 lbs overall.

Despite the hardships, I have to say these crops are tough. Some locations received almost no rain all season and the plants still grew and produced pods — even water-loving soybeans that have never really seen a drought like this during their short history here.

For more specifics on the past growing season, we have a great catalogue of *Bean Reports* at manitobapulse.ca/the-bean-report/. You can also sign up on our website to receive this timely newsletter. ■

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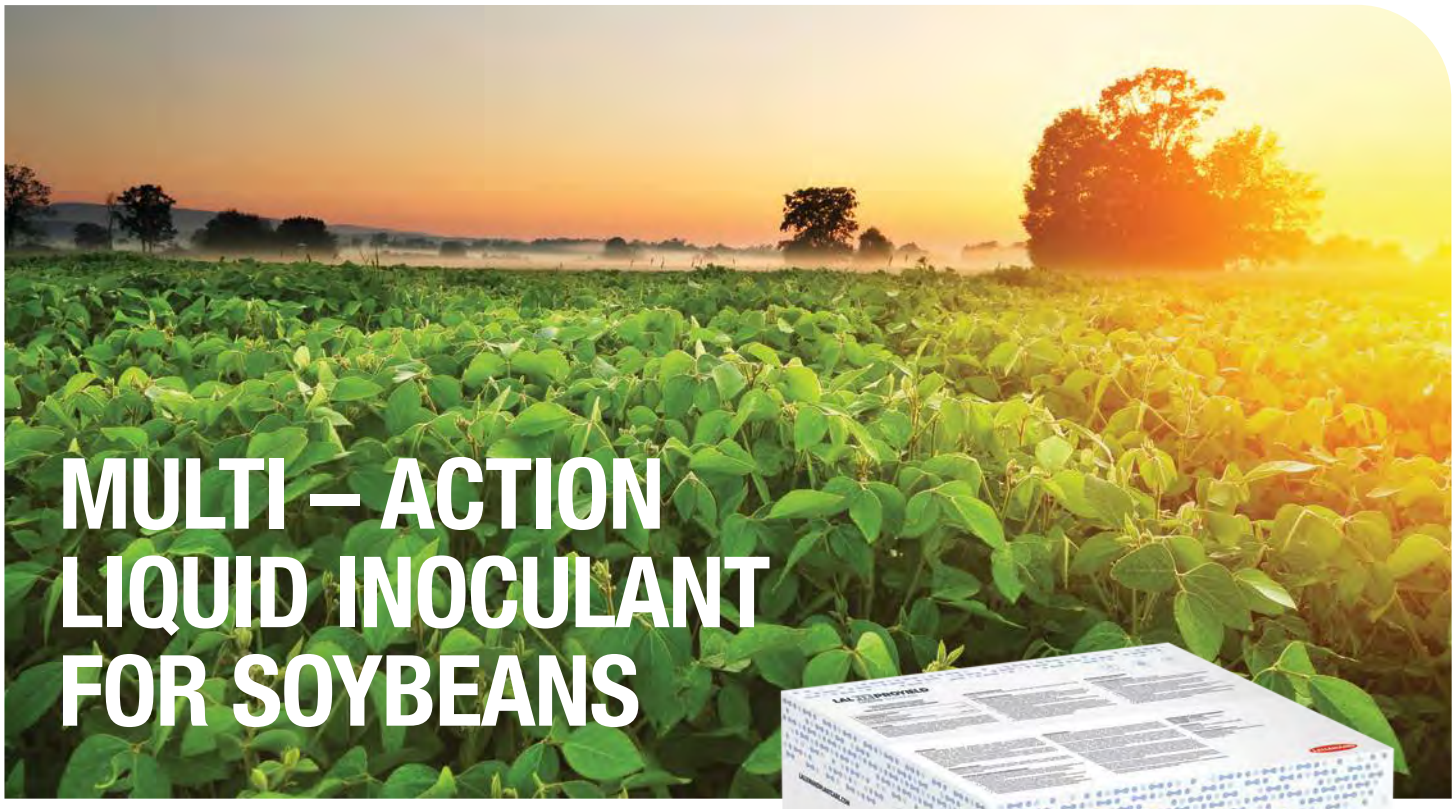

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Changing Plans

Fall rye termination timing in Manitoba soybean production

Virginia Janzen, MSc student and Dr. Yvonne Lawley, Department of Plant Science, University of Manitoba

ASKING QUESTIONS

Winter rye has a wide fall planting period and range of rates, depending on goals for the cover crop. Rye is normally planted in August through to October at rates ranging from 30 to 60 lbs/ac. A study was commenced at the Carrington Research Extension Centre (CREC) in 2018 to examine impact of rye planting dates and rates on following year rye plant stand, ground cover, weed suppression and impact on soybean production.

Fall rye is a popular cover crop option for fall seeding in northern growing regions due to its low seed cost, seed availability, wide seeding window, quick establishment and winter hardiness. Many of the benefits connected to growing fall rye, such as erosion control and weed suppression, relate to its abundant biomass production. As a cover crop with good winter hardiness, fall rye survives the winter and can provide ground cover the following spring. This also means that fall rye cover crops require termination in the spring. Therefore, an important question for managing fall rye cover crops is when to terminate in the spring.

When looking for advice, the common recommendation for terminating fall rye is to do so 14 days prior to planting your next crop. Terminating fall rye this far in advance is intended to minimize soil moisture loss, nitrogen tie-up and allelopathic impacts that could affect the next crop that will be planted. This plan for early termination is especially important during dry spring conditions or when that next crop needs access to early nitrogen, such as wheat, canola or corn.

There may also be conditions where leaving a fall rye cover crop to grow longer is helpful. An actively growing fall rye cover crop during a wet spring could help dry the soil and improve soil trafficability for earlier planting. From a nitrogen perspective, this strategy works best with legume crops, like soybeans, that fix their own nitrogen. There has been increasing interest from farmers using cover crops to "seed green" with legume crops into a living fall rye cover crop.

Weather can always throw a wrench into our well-intentioned plans. What could happen if your plan to terminate 14 days before planting is forced to change? For example, rain may prevent field access for a timely glyphosate application to terminate the fall rye cover crop. Or seeding for other spring crops may change your priorities for labour and equipment and again delay termination. When adopting any new practice, it is important to have Plan A and B at the ready to allow you to adapt to changing conditions.

It was time to look at these questions about fall rye termination timing ahead of planting soybeans under Manitoba growing conditions. We conducted a small-plot study at two sites with contrasting soil types (loam soil at Carman and clay soil at Kelburn) in 2019 and two sites (loam soil at Carman and clay soil at Morris) in 2020. We tested the recommended termination timing of fall rye (14 days prior to soybean planting) and compared it to two later termination dates (four days before soybean planting, one day after soybean planting), as well as a control treatment with no fall rye.

The Carman and Kelburn sites used open-pollinated fall rye seeded at approximately 70 lbs/ac, while the Morris site used hybrid fall rye seeded at 60 lbs/ac. Fall rye was seeded between September 11 and September 18 into canola stubble at all sites.

WHAT WE FOUND

One of the first measurements we took was how much the fall rye grew between termination dates. As termination timing was delayed, biomass increased from 14 days before to one day after soybean planting (*Figure 1*). Biomass of open-pollinated fall rye at Carman 2019, Kelburn 2019 and Carman 2020 was minimal when terminating at the recommended timing of 14 days before planting. The hybrid fall rye grown in Morris 2020 had greater spring growth and biomass for all termination dates (Figure 1).

The pictures in Figure 2 show you what seedbed conditions looked like on the day of soybean planting for the range of fall rye termination dates that we tested in the study. Among the treatments, there were really four different types of seedbed conditions: (1) the control treatment with canola stubble but no fall rye; (2) fall rye

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Figure 1. Fall rye biomass at three termination timings relative to the soybean planting date.

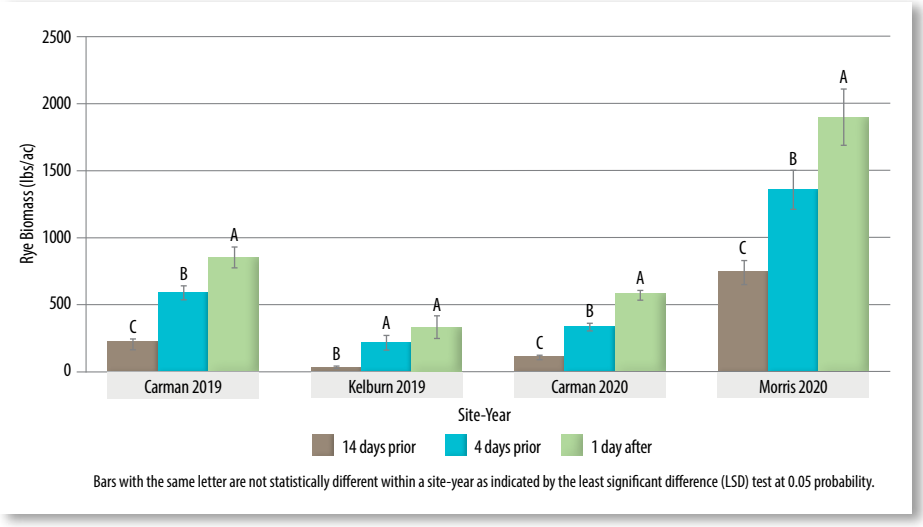

Figure 2. Ground cover provided by canola stubble and dead or living fall rye cover crops taken the day of planting at Carman 2020. Left to right: (a) control plot with no fall rye (b) fall rye terminated 14 days before planting (c) fall rye terminated four days prior to planting, and (d) living fall rye that will be terminated one day after planting.

that was completely dead; (3) fall rye that was dying; and finally (4) fall rye that was still actively growing.

Fall rye termination treatments affect soil moisture at seed depth (5 cm) after planting, but the trends seen were also influenced by the environmental conditions. In 2019, both site-years were dry at seeding and precipitation remained below the long-term average through June. The 2020 site-years were also dry at seeding, but precipitation was closer to the long-term average in June. As seen in Figure 3, soil moisture was similar among fall rye termination date treatments at both Carman sites, with the no cover crop control treatment generally having higher soil moisture. In Kelburn 2019, the fall rye treatments generally had more soil moisture at seeding depth compared to the no cover crop control. At Morris in 2020, the higher biomass from the hybrid fall rye cover crop resulted in a larger difference in soil moisture between the control and all the fall rye termination treatments. Soil moisture in the control treatment remained higher throughout the entire month, even after rainfall events. Under dry conditions, this extra water used by the hybrid fall rye with more biomass was not desired. This highlighted that growing a thinner stand of fall rye with less biomass

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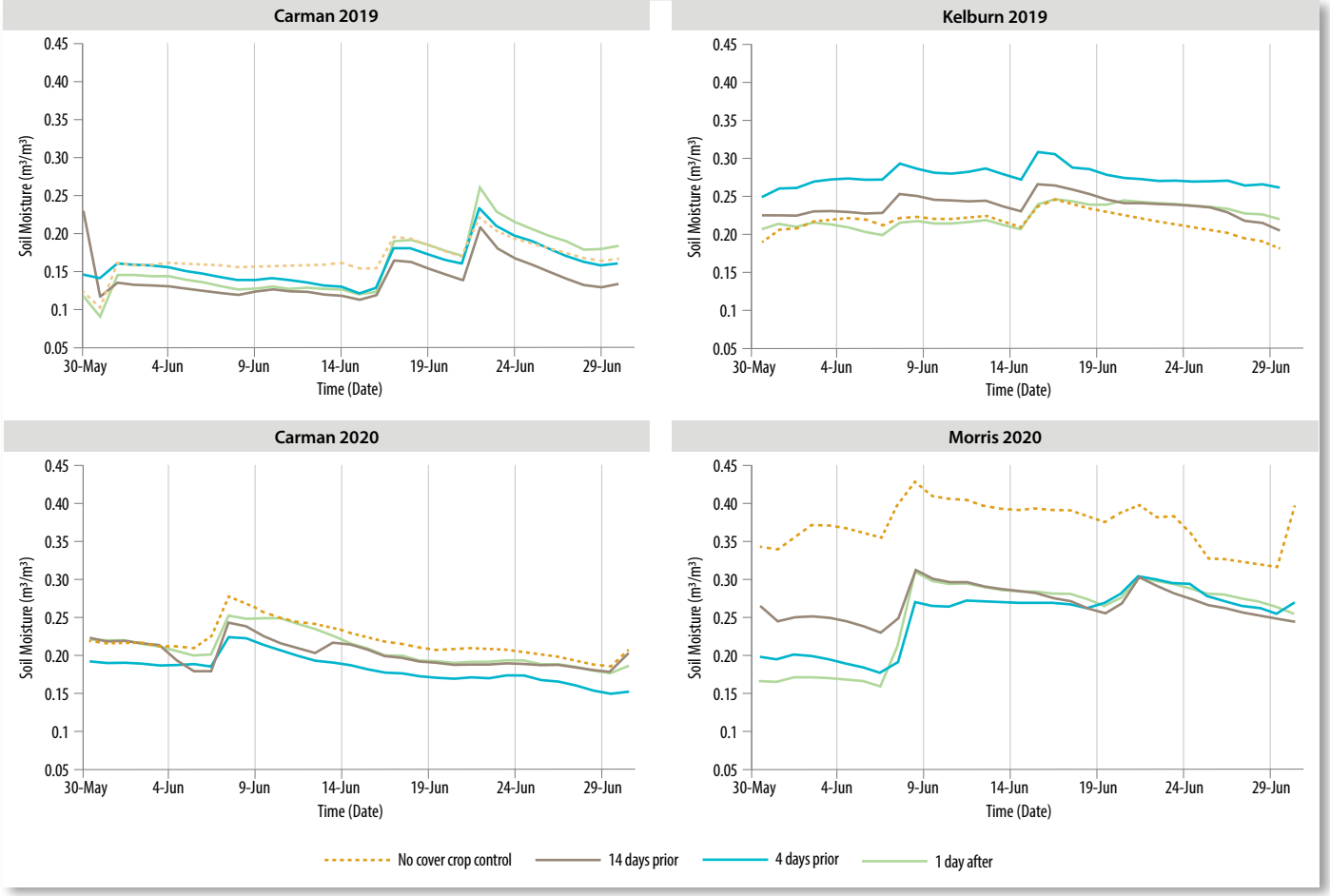
Figure 3. Soil moisture measured at seeding depth (5 cm) for three fall rye cover crop termination timings and the no fall rye control. Soil moisture was measured for thirty days after soybean planting at (a) Carman 2019; (b) Kelburn 2019; (c) Carman 2020; and (d) Morris 2020.



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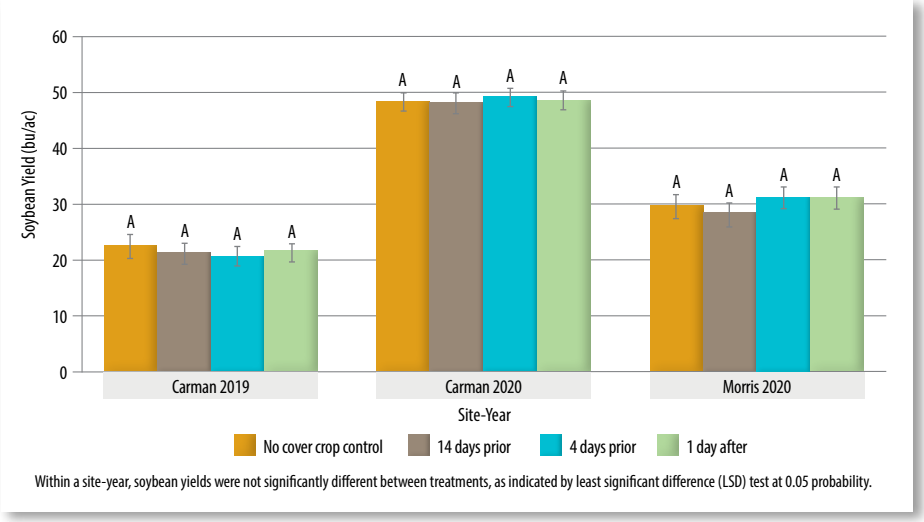
or terminating the cover crop early is important for managing cover crops in dry conditions. Looking at these results with a normal to wet spring in mind, it is easy to see the potential for using fall rye cover crops with sufficient biomass to dry the soil for improved trafficability and earlier planting.

One big question remains, what was the impact of these cover crop treatments on soybean yield? Unexpectedly, there was no soybean yield difference between the control treatment and the fall rye cover crop treatments (Figure 4, note that the Kelburn 2019 soybean yield data was lost due to deer damage). There was also no difference among the three fall rye termination treatments in the study. Although the experiments occurred during dry years where soybean yields were limited, it was interesting to learn that there could be more flexibility in spring termination timing for fall rye when soybeans follow in rotation.

Figure 4. Soybean yield after fall rye terminated at different spring timings relative to soybean planting.



Within a site-year, soybean yields were not significantly different between treatments, as indicated by least significant difference (LSD) test at 0.05 probability.

SUMMARY

Reducing the potential for soil erosion before and after low residue crops like soybeans is important in Manitoba. The most common goal for using cover crops is to improve soil health. This experiment did not lower yields by using cover crops to protect soil from potential spring erosion ahead of soybeans. This research suggests that we have the flexibility to terminate fall rye cover crops from 14 days before planting all the way to the day after planting without negatively impacting soybean yield. Thus, if and when spring termination plans for fall rye cover crops need to change before planting soybean, there may be little cause for concern.

Measuring soil moisture at seeding depth under dry conditions during these experiments confirmed that limiting the spring growth of fall rye can lessen the drying out of surface soils. In this experiment, where the growth of open-pollinated fall rye was minimal, there was a limited effect of fall rye on soil moisture available at seeding depth for the emerging soybean crop after planting. One day, when wetter conditions return to Manitoba, this experiment has also demonstrated the potential to manage fall rye cover crop biomass in order to dry soils ahead of soybean planting. In this study, the use of hybrid fall rye in one site-year produced more biomass at all termination timings and lowered soil moisture in the seeding zone relative to the no cover crop control treatment. Despite differences in soil moisture, this did not translate into soybean yield deficits.

If these results have piqued your interest, we recommend starting small with a few acres or a small field. Try terminating your first fall rye cover crop 14 days before planting soybeans. As you gain more experience, then try terminating a bit later when there is good spring soil moisture so you can gain experience with the equipment and conditions on your farm. ■

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Growing Impacts of Multi-Year Precipitation Deficits

Timi Ojo, Manitoba Agriculture and Resource Development

THE IMPACT OF water availability for optimal crop yield quality and quantity is well known. However, after almost a decade of being at the wet end of the pendulum, the growing impact of successive dry years appears to be a 'new normal' in Manitoba and much of the prairies. In a typical year, the average growing season precipitation does not meet crop water demand. The total average precipitation between May and August ranges from about 270–310 mm. Apart from the total growing season precipitation, the timing of the precipitation is very important. For most cereals and dry beans, effective precipitation during May, June and July is important. Precipitation received in August is generally too late to make any difference in yield. For soybeans and other crops that require a longer growing season, August precipitation may provide a late boost to yield. However, crops will not recover all the yield potential lost from previous dry months.

Apart from growing season precipitation, the water holding capacity of a soil determines how much water it can store. Comparing crop-water demand vs. supply shows how the scale tips between deficit and excess moisture:

- **Deficit Moisture** – spring soil moisture + growing season precipitation < crop water requirement
- **Excess Moisture** – spring soil moisture + growing season precipitation > crop water requirement

On average, the growing season precipitation (May–August) in Manitoba can supply about two-thirds of the 400–450 mm of moisture required for growing soybeans. This does not account for the precipitation that may be lost to either runoff during periods of high rainfall intensity or deep percolation below the root zone. The amount of soil water in the spring can be the difference between a good yield and a poor one.

The following five indicators were used to analyze the 2021 growing season:

1. **Previous Fall Soil Moisture Status** – The amount of water in the soil at freeze-up provides a good indication of soil moisture status at the start of the next growing season. Limited change in soil moisture status is expected over winter due to frozen soil that limits water infiltration and minimal evapotranspiration, mostly due to sub-zero air temperatures, no vegetation and snow cover. The 2020 fall soil moisture map showed that most locations had about 150–225 mm of available moisture heading into the 2021 spring (Figure 2a). Many of these locations were closer to 150 mm. In contrast, the 2019 fall soil moisture map showed many locations had higher available soil moisture heading into the 2020 growing season because of the rain and snowstorm received during the 2019 Thanksgiving weekend (Figure 2b). At the time of writing this article (early October), air temperatures have been consistently more than 12°C above seasonal average and there is no widespread frost across agro-Manitoba yet, making 2021 one of the latest, first fall frosts recorded. These factors indicate that the 2021 fall moisture map would be drier than 2020, except there are several days of soaking rainfall before freeze-up.
2. **Growing Season Precipitation** – The 2021 growing season started with dry topsoils due to a lack of overwinter snow accumulation (about 30–40% of historical average) and early snowmelt. Many areas received much-needed rain during the third week of May as concerns grew about dry seedbeds.

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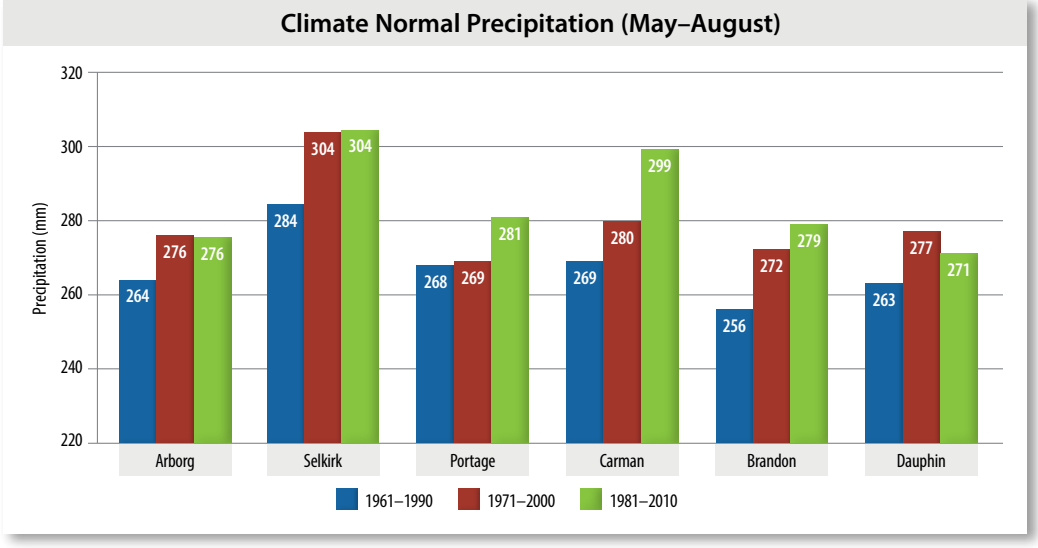
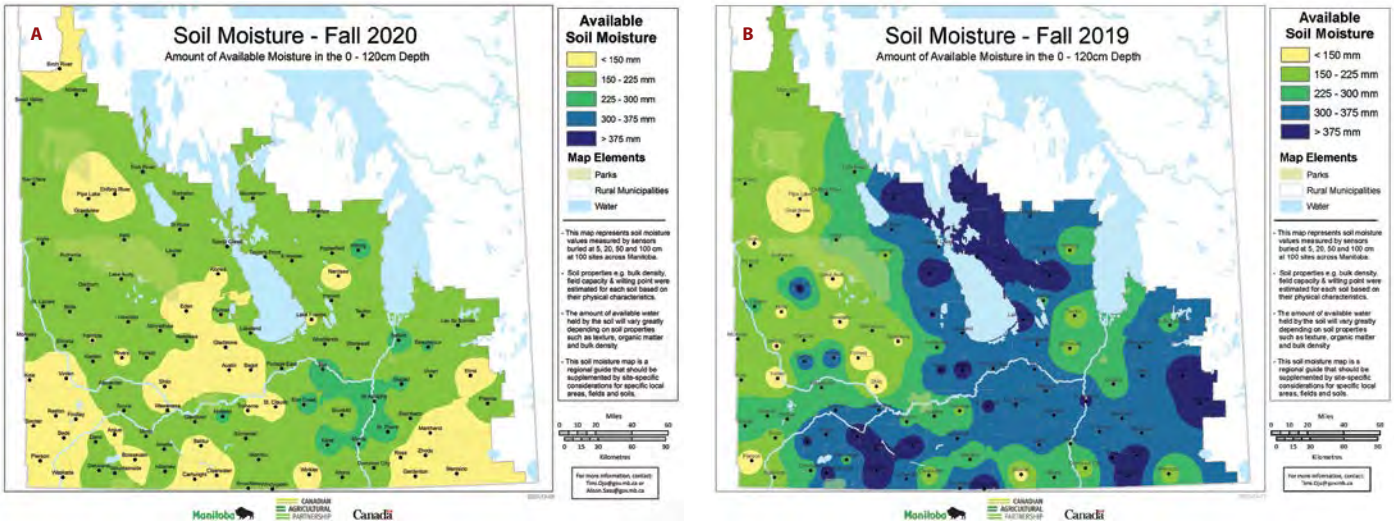


Figure 1. Climate normal precipitation from May to August at various locations in Manitoba. Data by Environment and Climate Change Canada.

Figure 2. Amount of available soil moisture prior to soil freeze-up in (a) 2020 and (b) 2019.



Crops tried to hang on during the early part of the growing season with localized rainfall in some areas. However, as crops approached the active vegetative stage in late June into July, the precipitation deficit intensified. St. Adolphe received a total of 191 mm between May 15 and September 30. However, only 21.6 mm of rain fell between June 10 and August 8. Figure 3 shows the worsening crop water deficit over the last three growing seasons. In early August, the difference between the amount of precipitation received and the expected crop water use for dry beans was -250 mm, with an additional -100 mm for most other crops. With this much deficit, the soils would have been depleted of any available soil moisture.

3. **Record Heat** — Limited precipitation and intense heat are two sides of the same drought coin. All locations ended the 2021 growing season with above-normal heat unit accumulation. Recent warm years typically resulted in locations receiving about 10% more growing degree-day accumulation than historical averages. Some areas such as Arborg, Moosehorn and Minnedosa were at least 20% above the normal growing degree heat accumulation at the end of the 2021 season. In Winnipeg, 2021 tied the previous record set in 1988 for the most days in a year (35 days) with above 30°C air temperature.

4. **Wind Speed** — Higher wind speed increases the rate of water loss by promoting soil surface dryness and higher transpiration. Analysis of wind speed at 25 locations in the spring showed that both the maximum and

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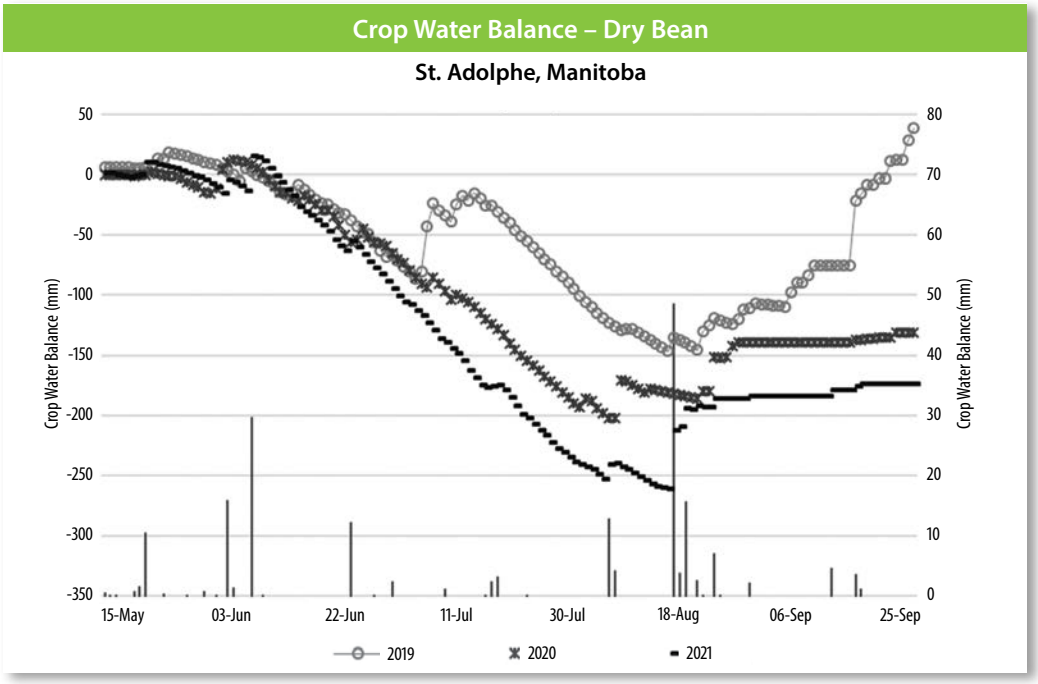


Figure 3. Crop water balance showing the deficit between the amount of precipitation received and the expected crop water requirement for dry beans at St. Adolphe between May 15 – September 30. Secondary axis shows the precipitation received in 2021.

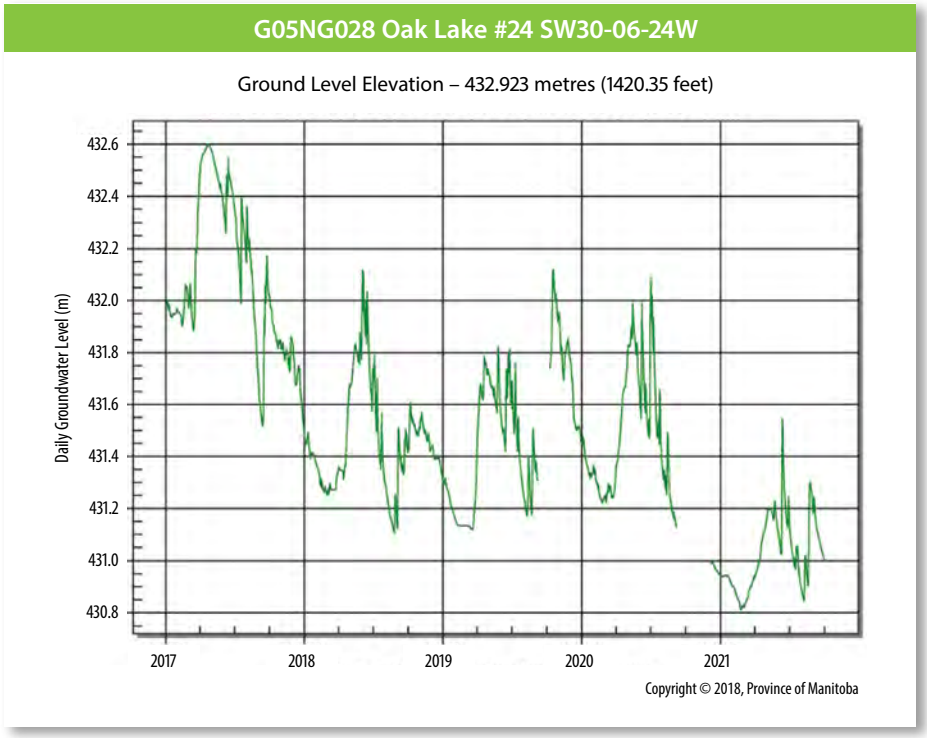
continued from page 33

average wind speeds in 2021 were greater than the 15-year average. On June 11, Clearwater, Somerset, Waskada, Snowflake, Killarney, Manitou and Windygates had wind gusts of at least 100 km/hr.

5. **Groundwater Level** – Manitoba and much of the Canadian prairies were in a 'wet cycle' for much of the last decade until 2016 (Figure 4). The hydrograph at Oak Lake, west of Brandon, showed that the groundwater level is currently at the lowest it has been in 12 years, at about 2.1 meters below the ground level. The 2017 growing season was a dry year. However, crop yield was generally above average, largely because of the impact of groundwater level close to the root zone.

The 2021 growing season can be summarized as being very dry, hot and windy. Although it is uncertain when the dry cycle will end and early indication from current fall soil moisture status is not very promising, one can hope for a better 2022 growing season with days of soaking rains to get things back on the right track. ■

Figure 4. Hydrograph of groundwater level at Oak Lake, Manitoba.



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Dry Bean Responses in a Droughty Year

Findings from tillage and nitrogen fertility trials

Megan Bourns, MSc, Agronomist – On-Farm Network, MPSG

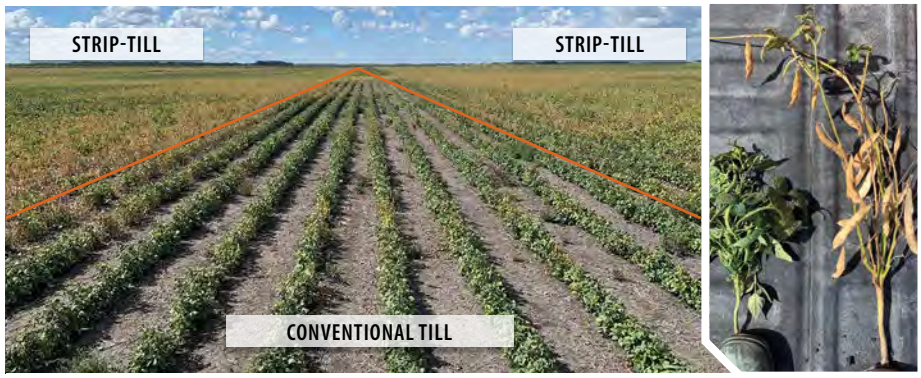
The 2021 growing season was full of production frustrations and environmental challenges, but it led to some interesting findings from On-Farm Network (OFN) dry bean trials. There were fantastic visual differences between treatments throughout the season and yield response at harvest in both the dry bean tillage and nitrogen fertility trials. Although these responses were found in a year with sub-optimal growing season conditions, the findings provide valuable insights into dry bean production and considerations for future management decisions.

Dry Bean Tillage

THE 2020 SEASON was the OFN's first go-around investigating tillage practices for dry bean production, comparing strip-till and conventional till for pinto beans. The main lesson from the first year centred around the soil protection benefit of strip-till, compared to more aggressive conventional tillage. There were some big wind events in early June of 2020 that led to enough soil blowing and sandblasting of the pinto bean seedlings that re-seeding was necessary in a large portion of the conventional tilled areas of the trial. Seedlings in the strip-till plots were not affected to the same extent.

In addition to the soil conservation aspects of a reduced tillage regime, moisture management is another obvious consideration—and a timely one, given the conditions of the 2021 growing season. The OFN hosted two strip-till vs. conventional till trials this season, one in pinto beans and one in black beans. Both trials were in south-central Manitoba on clay soils. Trials were established with tillage last fall, both on wheat stubble.

Early season observations from both tillage trials were uneventful until the transition between vegetative and reproductive growth stages. As flower buds and vines formed, the conventional tilled beans were visually smaller and less vigorous than the strip-till beans. We observed this growth difference in both the pinto bean and black bean trials, but the differences remained very persistent and stark at the pinto trial. In fact, the conventional tilled pinto beans were set back and persistently green to the point of being unable to harvest those plots. As a result, the conventional till beans were tilled under and yield was effectively zero for those plots.



Difference in pinto bean maturity between strip-till plots (further dried down) and conventional till plots, September 7, 2021.

Just a few miles away at the black bean trial, differences in growth and vigour between tillage treatments were evident as the beans moved into flowering, but they were much less obvious than in the pinto bean trial. The most notable difference was in the extent of vine production, where the strip-tilled beans had more vine growth than the conventional tilled beans. At this trial, beans from both tillage treatments progressed through maturity and dry-down as expected and we were able to harvest as planned. The yield difference between tillage treatments was significant, with strip-till beans yielding 290 lbs/ac more than conventional tilled beans (Figure 1).

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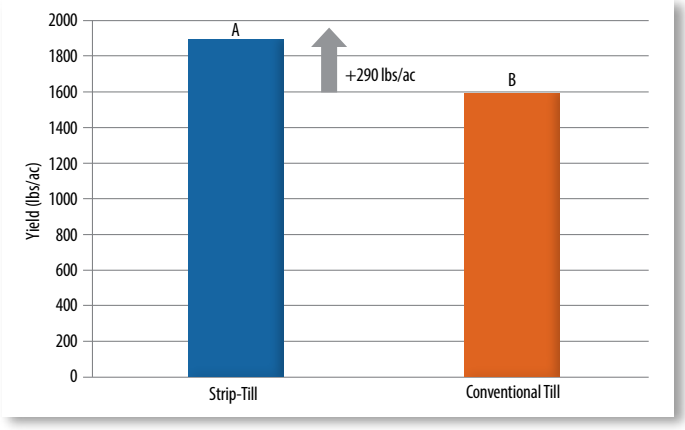

Figure 1. Black bean yield from a 2021 on-farm trial comparing strip-till and conventional till.

LOOKING AHEAD – THE NEXT QUESTIONS

So, we know reducing tillage in a moisture deficit year can influence dry bean growth and yield. One of our questions is, how much of a difference did tillage regime make in soil moisture throughout the season? In addition to visual observations and yield, this year, we tracked soil moisture throughout the growing season to a 1 m depth in both tillage trials. Data analysis is ongoing, and results will be available soon!

Dry bean tillage trials will continue if there is farmer interest. We have captured dry bean response to strip-till in two dry years. Investigating this question under different growing season conditions may help flesh out where and when strip-till is a beneficial practice for dry bean production.

Dry Bean Nitrogen Fertility

INVESTIGATION OF DRY bean response to nitrogen (N) in Manitoba has been ongoing since 2017. The Soybean and Pulse Agronomy Lab at the University of Manitoba conducted small-plot research investigating pinto and navy bean yield response to spring broadcast. It incorporated N fertilizer at rates ranging from 0–140 lbs N/ac. They found a significant yield increase only with the highest rate of nitrogen; however, there was no significant difference between economic N return for any N fertilizer treatment.

These small-plot findings generated interest in exploring N fertilizer strategies for dry bean production on-farm, at a full field scale. The OFN began dry bean N fertility trials in 2019. To date, five trials have been conducted, investigating some combinations of fertilizer rates ranging from 0–140 lbs N/ac in pinto, navy and black beans. Until 2021, field-scale results reflected small-plot findings—that there were no significant yield increases with N fertilization compared to the control, regardless of N rate or bean type.

Each growing season of the small-plot and field-scale trials had been drier than normal. So the question about the effect of N rate on dry bean yield persisted—in a year with more "normal" precipitation and higher yield potential, would those N rates make a difference in yield? With that question in mind, we set up another trial in 2021 comparing rates of 0, 35 and 70 lbs N/ac (spring broadcast and incorporated urea) in pinto beans. Our goal of testing this question under more "normal" moisture conditions obviously did not play out as planned; however, our findings are quite interesting and may shed some light on the lack of yield response in other years.

Similar to the dry bean tillage trials, our observations noted similar growth and vigour among N fertilizer rate treatments

Visual comparison of dry bean growth between 70 lbs N/ac (left) and 0 lbs N/ac (right), July 14, 2021.

until the transition to reproductive growth stages. Once flower buds started to form, it was evident that the 0 N control strips were less vigorous than the N-fertilized strips, and these differences persisted through the R stages. Not surprisingly and complementary to the visual differences in vigour throughout the season, pinto bean yield response to N fertilizer rate was significant. The 70 lbs N/ac treatment yielded 150 lbs/ac more than the 0 N control (Figure 2). The 35 lbs N/ac treatment yielded statistically similarly to both the 0 N control and the higher rate (70 lbs N/ac) of N fertilizer.

So, why did pinto bean yield respond to N fertilization in this dry year? The answer is not likely simple, but some supplemental data we collected this season may shed some light. In addition to fertilizer-N, soil nitrogen and nodule formation can contribute to dry bean N nutrition. Typically, nodulation ratings tend to decline with increasing N fertilizer, as we would expect. This season, nodulation ratings were "fair" in the 70 lbs N/ac treatment and "good" to "excellent" in both the 0 and 35 lbs N/ac treatments. This is consistent with findings in 2019 and 2020. So, what was different about

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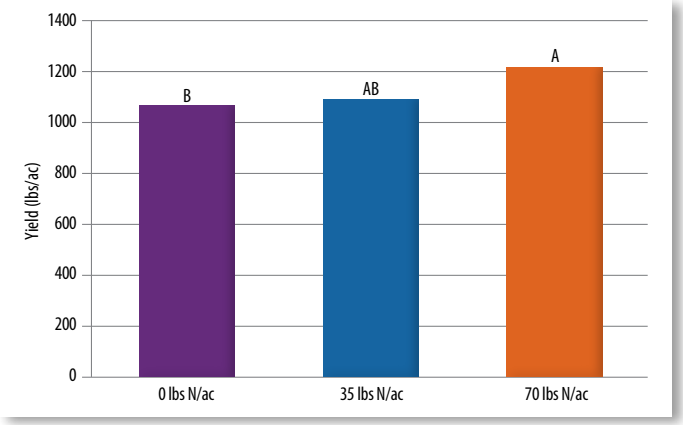

Figure 2. Pinto bean yield response to N fertilizer rate at an on-farm trial in 2021.

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the 2021 season that led to an increase in yield with the higher rate of N fertilizer? Perhaps mineralization or lack thereof holds the answer.

This season, as a data collection add-on to the dry bean N trials, we established microplots in each of the 0 N check strips of the trial, where we soil sampled every couple of weeks to a depth of 12 inches. The intent was to track nitrate over the course of the season. As we know, nitrate levels will vary as the season progresses and mineralization is one of the processes governing this temporal variability. Mineralization is the soil process whereby microbial or organic N is transformed to mineral, plant-available N and this can contribute to crop N-nutrition in-season. Interestingly, this season, our microplot sampling revealed very consistent nitrate in the top 12 inches from the middle of June through to the end of the season (Figure 3).

Mineralization requires heat and moisture, and the latter was obviously in short supply for the majority of the 2021 growing season. Limited moisture and limited mineralization could have reduced the supply of soil-derived nitrogen for the dry beans this season compared to other years, increasing the demand for fertilizer-N. Perhaps, this played a role in the significant yield differences we saw this season. However, further investigation into the dynamics of dry bean N supply is required.

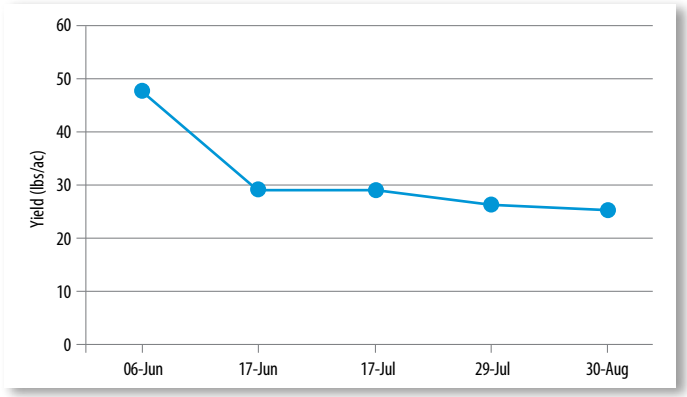

Figure 3. Nitrate over the season in the top 12 inches from 0 N check strips.

LOOKING AHEAD – THE NEXT QUESTIONS

Dry bean yield response to N fertilizer has not been common in small-plot or on-farm trials. The question that remains is, why? Dry bean N nutrition is a dynamic combination of soil-derived N, fertilizer-N and potentially nodule-N. Further understanding of these three N sources and their interactions will aid in our ability to predict where and when N fertilizer is required and at what rates response is likely. This will require more dry bean N fertility trials, with increased data collection of nodule formation, soil-N dynamics through the season and yield response in different growing season conditions. The OFN will continue dry bean N trials with interested farmers! ■

Dealing with Soybean Cyst Nematode in Manitoba

Dr. Mario Tenuta, Professor of Soil Ecology, Department of Soil Science, University of Manitoba

THE SOYBEAN CYST nematode (SCN), *Heterodera glycines*, is the most damaging pest or disease of soybeans in Ontario and the U.S. The nematode reduces the vigour and increases the susceptibility of soybeans to stresses (e.g., moisture) and promotes soybean sudden death syndrome (SDS) caused by *Fusarium virguliforme*. SCN causes yellow stunting of soybeans where plants are visibly delayed in growth and canopy closure, and chlorotic indicating nitrogen deficiency (Figure 1). Yield can be reduced by as much as 70% in heavily infested fields. Yield depression results from a combination of decreased pod setting and filling, weed presence from delayed canopy closure and the eventual establishment of SDS.

SCN has steadily expanded its geographical range as the soybean crop has expanded its range in North America. Important to Manitoba, SCN has moved northward along the Red River Valley through South Dakota, Minnesota and North Dakota. It is currently present in counties of Minnesota and North Dakota bordering Manitoba. SCN is also a pest of edible beans, particularly kidneys. A dark-red kidney bean field in Minnesota in 2016 was diseased by SCN. Further, SDS was reported this summer (2021) in a county in North Dakota bordering Manitoba. Taken together, Manitoba is destined to have to deal with SCN as a major, if not the major, disease issue of soybeans within a decade.

With prior support from MPSG, the University of Manitoba found SCN in four fields in the province in 2019. Levels in the fields were very low (< 50 eggs/100 mL soil), indicating the pest had recently been established. In July 2021, we observed a patch of yellow stunting of soybean (Figure 2) and nematode cysts on roots (Figure 3) in the headland area of a field in the R.M. of Thompson. Our doctoral student, Nazanin Ghavami, confirmed the presence of cysts filled with eggs in the soil. Egg levels were 1,250–1,700 eggs/100 mL soil, a low to moderate level.

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Figure 1. SCN-affected soybeans on July 8, 2021 in a field in the R.M. of Thompson, showing typical interveinal chlorosis and stunting.

Figure 2. Soybean plants in a headland area in a commercial field showing yellow stunting of soybeans.

Figure 3. Soybean roots showing cyst nematodes.

Table 1. Egg counts of SCN in soil within and around an affected patch in the R.M. of Thompson, sampled September 3, 2021. Levels were moderate to high within the centre of the patch.

SCN PATCH ANALYSIS – R.M. Thompson Field, September 2021
(#eggs/100 mL soil)

North into Good Soy Growth

Distance (m)	0	10	20	30	40	50	60	70	Distance (m)
24	0	0	–	0	0	–	0	0	24
18	0	0	–	0	0	–	0	0	18
12	0	295	–	2,540	68	–	38	65	12
6	0	1,365	1,989	4,956	4,632	7,797	4,153	1,534	6
0	24	33	–	149	255	–	163	33	0
Distance (m)	0	10	20	30	40	50	60	70	Distance (m)

West into Good Soy Growth

East into Good Soy Growth

Areas without values were not sampled.

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The field is on the light side and there was a drought, which is consistent with SCN-affected fields first being noticed on light soils in dry years. Nazanin's molecular analysis of roots with cysts from both the field and greenhouse in pots containing field soil (Figure 4) confirmed the cysts to be SCN (*H. glycines*).

In early September 2021, the field was revisited. The SCN-affected patch was very weedy, which was not a surprise. However, we were surprised to see the soybean plants were green and growing, whereas the rest of the field was maturing (Figure 5). There were good rains before the revisitation, which alleviated water stress and the plants were able to green up and try to fill what few pods were present. The affected patch was sampled intensively in a grid pattern for the distribution of SCN levels in the soil. Sampling was done from the roadway edge, 24 m into the field and 70 m across. The sampled area extended beyond visibly diseased soy plants into good areas of the field. The student found that SCN levels were moderate to high in the centre of the patch and tapered to zero or near zero into visibly good soy growth areas (Table 1). This showed us the diseased areas were linked to higher levels of SCN in the soil. It also means that as the pest expands from this patch, the rest of the field will be affected.

With SCN now present in five rural municipalities in Manitoba and the first confirmed field with levels of SCN that are high enough to produce low-yielding diseased patches, what should we do? For starters, the chance of moving the pest between fields should be reduced. This means air or water pressure washing of implements between fields. Also, include SCN resistant varieties in your soybean rotation, regardless of whether you have SCN or not. If SCN is present, consider lengthening the rotation time between soybean years.

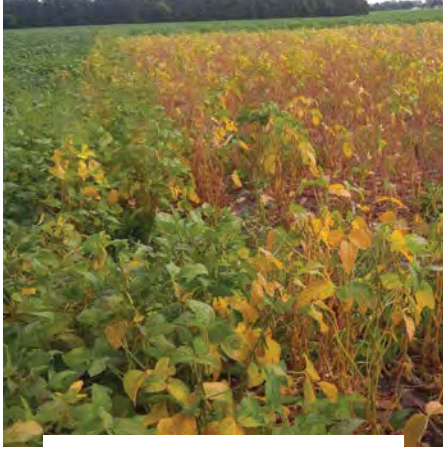
Figure 4. Roots of soybeans grown in the laboratory infected with SCN from a field in the R.M. of Thompson. Soybean cysts are evident inside the green box and a nitrogen nodule is shown in the red box for comparison.

Figure 5. The same field patch shows soybeans recovering from drought stress caused by SCN damage. This picture was taken September 3, 2021, after several rains kickstarted SCN-affected plants to continue growing because of moisture availability.

Scout fields in early July for yellow stunted and chlorotic soybean patches. Headlands, depressions, entrance ways and drainage courses leading to the edge of fields are often the first areas to encounter SCN. Light soils are more prone to see SCN damage. It is not that these fields may have more SCN in them, it is that moisture stress compounded by SCN damage is more apparent in light soils than in heavier soils. Heavy soils are just as susceptible to the establishment of SCN as light soils. Dig up roots of suspected SCN plants and look for the immature, white cysts of the females. This is a very effective scouting tool. In fact, the SCN field observed this past summer was spotted by a consulting agronomist that scouted roots and alerted the MARD pulse and soybean specialist, Dennis Lange.

If you find suspected cysts, try popping them between your fingernails. If the suspected cyst pops like a small zit, it isn't a young nodule but likely SCN. Affected field areas often go years without being identified to be caused by SCN. This is because SCN-affected areas are easily confused with other issues such as iron chlorosis, field variability in moisture availability, waterlogging damage and herbicide damage. Scouting and soil analysis are the most effective tools for figuring out the presence of SCN. If you have a suspected SCN field or need help with scouting, contact MARD or MPSG extension staff. We all work closely together and can help. Our laboratory can assist with identification and soil analysis. Commercial lab services are available from Agvise Laboratories. I'd use a commercial service to track the success of management practices and soil levels if you know SCN is in a field.

Lastly, MPSG maintains an up-to-date web page on our latest information on the distribution of SCN in Manitoba and has great scouting and management tips (manitobapulse.ca/soybean-cyst-nematode/). ■



Early maturing progeny rows (right) at Ottawa are even earlier than the triple zero check variety, Maple Presto (left).

Short-Season Soybean Breeding at AAFC

Dr. Elroy Cober, Research Scientist, Agriculture and Agri-Food Canada

THE OTTAWA RESEARCH and Development Centre hosts Agriculture and Agri-Food Canada's (AAFC) short-season soybean breeding program. This program develops maturity group (MG) 00 and earlier soybeans for short-season regions across Canada. The breeding objectives include early maturity, high yields and disease resistance, as well as objectives for the food-grade market. These include higher protein and end-use traits, such as fewer dormant seeds after soaking and firmer tofu texture.

Some seeds remain dormant after soaking. This trait is controlled by both the variety and environmental conditions during seed development. Hard seeds need to be removed before making soymilk and tofu.

The first, preliminary yield trials are carried out at Morden, Manitoba and Ottawa, Ontario to allow selection for broad adaptation. Through more advanced levels of yield trials, locations are increased to Morden and Portage la Prairie in Manitoba, plus two locations in Ontario and two in Quebec. Following these trials, promising experimental lines are grown in variety evaluation trials across these provinces. Recent variety releases include AAC Dale to SeCan, AAC Halli to Interlake.org and AAC Springfield to Springfield Mills. New, as of yet unnamed, releases to SeCan include OT18-09 and OT18-15. AAC Edward is also a very early maturing variety released previously to SeCan.

The participation of the AAFC stations at Morden and Portage in early generation trials allows for testing of adaptation to Manitoba throughout the yield trial stages of the breeding program. This project and the Manitoba trial sites are only possible through the support of the partners of the Canadian Field Crops Research Alliance (CFCRA), which includes Manitoba Pulse & Soybean Growers and AAFC. The CFCRA short-season soybean breeding project is a collaboration between soybean breeding programs at AAFC–Ottawa, the Crop Development Centre at the University of Saskatchewan and the Centre de recherche sur les grains (CEROM) in Quebec. We share parents, exchange segregating populations and run coordinated yield trials to ensure that short-season soybeans are adapted across the major growing areas.

Molecular markers for early maturity are being used to screen potential parents to allow for targeting early maturity in crosses. Genomic scientists at AAFC–Ottawa work to develop more specific markers for early maturity. When the actual gene, which is responsible for an early maturity QTL, is identified, it is possible to develop markers within that gene. This becomes a "perfect marker" since it is no longer just associated with early maturity but is actually in the gene responsible for early maturity. It is also possible to know which version of a maturity gene a line contains since it is possible to have a late, intermediate or early version of a maturity gene in some cases.

Resistance to soybean pests is also a breeding objective of the AAFC program. Phytophthora root rot is evaluated at a naturally infested nursery in Ottawa. White mould is evaluated by AAFC scientists on Prince Edward Island, where the naturally cool and moist growing season favours white mould development. The white mould nursery is also inoculated with sclerotia to increase the disease's pressure. Soybean cyst nematode (SCN) continues to expand into short-season growing areas in Ontario, Quebec and more recently Manitoba, so breeding for SCN resistance has been added to the AAFC program. The AAFC station at St-Jean-sur-Richelieu provides greenhouse screening of parents for resistance to two SCN races (now called HG types).

The Ottawa AAFC program has a long-running program developing food-type soybeans and has released natto, tofu and edamame varieties. The CFCRA soybean breeding project has an objective to increase soybean seed protein. Increased protein is valuable for producers in Manitoba as it helps improve the lower protein levels seen in western Canada. Higher protein is also important for food-grade soybeans, where growers receive premiums for export soybeans meeting the requirements of food manufacturers. The Grain Quality Lab at AAFC–Ottawa evaluates end-use traits for food-grade soybeans in testing for seed dormancy after soaking – the 11S:7S ratio (which is a measure of types of protein subunits with correlation to tofu quality and sulphur amino acid content) and tofu firmness. Soybean protein content and protein

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Tofu firmness is defined as the maximum force measured from a one-inch-diameter probe that is pushed into tofu samples made in pill bottles.

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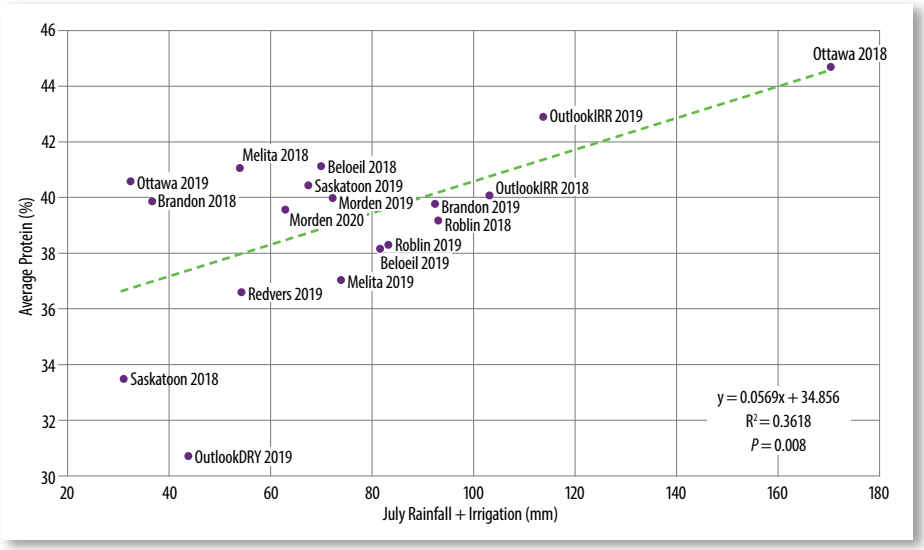
quality are independent traits and both higher protein concentration and quality are desirable.

Since soybean seed protein is often lower in western versus eastern Canada, a CFCRA project was funded to address lower soybean seed protein in western Canada. A series of 20 low to high protein lines have been grown since 2018 at sites across Canada. Seed protein content and quality are being evaluated and compared to climate data at each site. In a preliminary analysis undertaken by scientists at AAFC–Brandon, water accumulation during July was seen to play an important role in seed protein content (Figure 1). Drought stress may play a role in final seed protein since nitrogen (N) fixation will be reduced in soybean plants before photosynthesis starts to be reduced. Reduced N fixation may result from even minor drought stress and may be responsible for some of the lower seed protein levels seen in western Canada. The final year of this trial has been grown in 2021 and will allow us to examine the effect of drought stress across the prairies seen this summer. In addition, genomic scientists at AAFC–Ottawa are examining gene expression differences from multiple sites across this trial. The objective is the identification of geographically important genes for protein content.

Figure 1. July rainfall (plus irrigation) versus average seed protein on a site basis for the first two years of the trial. Water plays an important role in nitrogen fixation, since during drought stress, nitrogen fixation is reduced before photosynthesis is reduced.



Short-season soybean breeding at AAFC–Ottawa involves research partners from multiple disciplines and multiple locations across Canada. Thanks to the CFCRA funding partners, including MPSG, for providing the funding for this integrated, collaborative soybean breeding project. ■

Laura Schmidt, Production Specialist – West

MUTANT PEA AND SOYBEAN PLANTS

Did you have soybean or pea plants that stayed green when the rest of the crop was ripe? Did they have an explosion of nodes with little or no internode space? Maybe they either had no pods, a few deformed pods or clusters of seedless pods. These plants may have been male sterile mutants or, in the case of soybeans, may have had the physiological disorder, greenstem.

Male sterile (female fertile) plants are spontaneous mutants. They remain green longer and have little to no seed production. While these plants don't produce pollen, they can set seed if insects carry pollen from other nearby plants. However, pods often only contain one or two seeds and won't contribute much to yield.

On the other hand, greenstem occurs in scattered soybean plants throughout the field and is associated with drought. Stems remain green after neighbours have matured and clusters of buds form at the axils and top of the plants. There's very little to no seed production.

While we see a few of these plants every year, hot, dry environmental conditions in 2021 may have increased the amount of male sterile mutants and greenstem soybeans.

Male sterile mutant peas, July 21

Greenstem soybeans, Sept. 20

Faba Beans – Agronomy Notes from a Small-Acre Crop

Laura Schmidt, MSc, PAg, Production Specialist – West, MPSG

FABA BEANS ARE a small-acre crop in Manitoba, with roughly 7,500 acres grown annually. They are well adapted to cool, moist growing conditions and have the best nitrogen fixing ability of pulse crops, making them an attractive fit for agro-Manitoba. They are grown for human or animal consumption. Fabas destined for human consumption have traditionally been marketed to Egypt. More recently, local processing capacity in the province has expanded and faba flours, flakes, splits and whole beans are available to consumers. As capacity has increased there is a need to keep pace with both research priorities and agronomic understanding of this crop. So, here are some agronomy notes from 2021 to improve familiarity with this exciting pulse crop.

Faba beans at V2 one week after a hard frost (low of -4°C, below 0°C for 8 hours). Note the blackened edges of the frosted leaves.

No need to worry with a cool start to the season. – Faba beans tolerate low temperatures well, and cool soils or late spring frosts are no reason for concern. Plant fabas once soils are passable in the spring and they'll begin germinating once soil temperatures reach 3–5°C. The end of May in 2021 brought a hard frost to the northwest regions and down around the Riding Mountain National Park. This frost killed any above-ground soybeans at the time, of which thankfully there were few. Faba beans were around V2 (two unfurled bifoliate leaves) and showed signs of frost damage with dark splotches on leaf edges. In the rare instances where all of the above-ground tissue is damaged, fabas will regrow from the cotyledons below ground, much like peas.

A favourite snack of the pea leaf weevil (PWL). – While PLW has peas in the name, faba beans are their preferred food source. While scouting faba fields this August, leaf notching from PLW adults was easy to spot in western Manitoba. Catching weevils for proper identification is much easier in fabas than peas because you can easily sweep net through faba crops.

While the damage is already done by the larvae by late summer, scouting for PLW in the fall can help inform management decisions for next year. Seed treatments are one of the more effective tools and making note of PLW

Leaf notching on the top of a faba plant and PLWs that were captured using a sweep net.

populations ahead of winter can be one way to determine if seed treatments will be economical. However, weevils will fly in the spring to reach new faba and pea crops, so they will readily disperse throughout a region.

Look-a-like foliar diseases and the question of fungicide use. – Leaf spotting from foliar diseases is common in faba beans from flowering to podding. Several pathogens can be to blame including chocolate spot (*Botrytis* spp.), *Alternaria* spp., *Stemphylium* spp. and *Fusarium* spp. Visually, these pathogens are tough to tell apart in the field and need to be plated in the lab for accurate diagnosis. However, since they are all fungal diseases, a fungicide should take care of it, right?

Researchers investigated foliar fungicides applied at 50% flowering over five years (2016–2020) at four locations in Alberta and Saskatchewan. Disease

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Lygus bugs pierce pods, leaving behind dark sunken areas from enzymes in their saliva. While not yield-limiting, this causes concerns for quality and grading.

severity was lower with fungicide application, but there wasn't much of a yield response. At $8–9/bu faba beans, the economics did not pencil out. In Manitoba, we have had one on-farm trial in 2020, where foliar fungicide yielded 15.7 bu/ac more than the untreated strips resulting in a return of around $100–125/ac. Here, I would suspect that timing is everything. Foliar diseases generally develop later in the growing season for fabas and it's those cases of early infection with an environment conducive for disease development that a fungicide application will pay. This on-farm trial received 167% of normal rainfall in July and fungicide was applied at the optimal time to protect yield. An on-farm test would be one way to see if fungicide application is paying on your farm.

Lygus bugs can cause big quality damage. — Fabas are late maturing, resulting in movement of lygus bugs into fabas once alfalfa is cut or canola is swathed. Hot, dry weather like we had this year promotes lygus bug development and damage can be worse under these conditions.

Yield losses are not generally a concern, but quality can quickly be impacted. Lygus pierce pods to suck plant sap. Visible damage is found on the seeds due to enzymes in their saliva. Fabas need to have less than 4% perforated damage to be graded No. 3 Canada or better.

Fabas are susceptible to lygus damage until the pods and seeds become firm and most feeding occurs at the top of the plant. Monitor fields during pod development. A nominal threshold to prevent 15% damage is five lygus bugs per 10 sweeps. At research plots in Alberta in 2015 and 2016, a single lygus bug per ten sweeps resulted in 10–12% damage.

While control may be warranted, pollinator insects are important for seed set in fabas and should be taken into consideration when making spray decisions. Having pollinators in your fabas has been shown to increase yield by 17%, on average, so use practices or products that minimize the impact to pollinators. ■

Dry Bean Variety Development at AAFC–Morden

Dr. Anfu Hou and Dr. Robert L. Conner (retired), Agriculture and Agri-Food Canada, Morden Research and Development Centre

Dry bean breeding and research at Agriculture and Agri-Food Canada (AAFC) have been funded by Manitoba Pulse & Soybean Growers (MPSG) and the Pulse Science Clusters (Growing Forward I and II, and the Canadian Agricultural Partnership) to develop dry bean varieties for the pulse growers and industry in our region, and to generate knowledge for the scientific community.

THE BREEDING OBJECTIVES at AAFC–Morden have focused on yield improvement, early maturity, resistance to common bacterial blight, anthracnose, root rot and white mould, and improved seed quality. In collaboration with pulse pathologists and other researchers across Canada, understanding basic genetics and variety improvement for dry bean resistance to diseases and abiotic stresses (e.g., extreme moisture conditions) remains a priority.

Breeding activities have focused on major bean market classes, including pinto, navy and black beans, as other minor bean types (e.g., small red, Great Northern, yellow, pink) occupy low acreages and the variety replacement process is generally very slow. These breeding and research efforts have responded to changes in production trends, such as demand for more upright growth for direct harvest and later maturity for higher yield potential. And the program has carried out research projects on the application of molecular markers to disease resistance, seed quality and genetics of agronomic characteristics (e.g., maturity, yield and seed germination).

Students and postdocs have been trained through this program. And the research results have been presented at numerous scientific conferences, published in refereed journals and communicated to producers.

To date, there have been 13 breeding lines/germplasm supported for registration by the Prairie Recommending Committee for Pulse and Special Crops (PRCPSC) of the Prairie Grain Development Committee (PGDC). Those materials are being used in crosses for further variety development. Within AAFC, once a breeding line is released, the commercialization is taken over by the Office of Intellectual Property and Commercialization (OIPC). Calls for proposals are posted annually at OIPC and interested companies submit their proposals for adopting and marketing specific varieties. The breeders assist with pedigreed seed production in Idaho, where its dry and hot environment ensures the production of high-quality seeds free from major diseases like common bacterial blight.

Table 1. Agronomic performance of AAC Scotty, Portage, CR10875-6-2, S09-27C compared to the respective check cultivars* from the long-season, wide-row dry bean cooperative registration trials conducted at four sites in Manitoba (Morden, Winkler, Carman and Portage la Prairie).

Cultivar	Yield (lb/ac)	Days to Maturity	Seed Size (g/1000 seeds)	Plant Height (cm)	Lodging (1–5)†
AAC Scotty	1429 A	97 A	428 A	53 A	1.4 A
Etna*	1137 B	92 B	415 A	49 A	1.4 A
Portage	2589 A	101 B	193 A	55 B	1.2 B
Envoy*	2142 B	100 B	189 A	47 B	1.8 A
CR10875-6-2	1468 A	98 A	454 A	46 A	1 .5 A
Etna*	965 B	96 A	438 A	44 A	1.4 A
S09-27C	1377 B	97 B	185 A	49 AB	1.6 A
Envoy*	933 C	95 B	168 B	44 A	2.1 A
T9905*	1632 A	100 A	187 A	51 B	1.9 A

Means within a column not sharing an uppercase letter differ significantly at the $p < 0.05$ level according to Fisher's LSD test.
† Lodging was rated as: 1 = upright plant growth with no lodging; 5 = heavy lodging with plants falling

CR318-6 Cranberry

Three varieties have been registered since 2009, including AAC Scotty, AAC Portage and Carman Black, and the exclusive rights of the varieties have been granted to Canterra Seeds Ltd. for marketing.

AAC SCOTTY CRANBERRY BEAN (CR318-6)

AAC Scotty was registered in 2017 and distributed by Canterra Seeds in Winnipeg/Meridian Seeds in North Dakota. This cranberry bean variety is high-yielding, reaching an average yield of 125% of the check cultivar, Etna (Table 1). The seed size of AAC Scotty (428 g/1,000 seeds) is slightly larger than Etna (415 g/1,000 seeds). The average maturity of AAC Scotty (97 days) is five days later than Etna (92 days). AAC Scotty is resistant to anthracnose (races 73 and 105), while Etna is susceptible (Table 2). And Scotty also has better resistance to common bacterial blight (CBB) than Etna. More information can be found in a publication on *AAC Scotty cranberry common bean* in the Canadian Journal of Plant Science (CJPS) (doi.org/10.1139/CJPS-2018-0110).

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AAC Scotty

AAC PORTAGE NAVY BEAN (056C-96204)

AAC Portage was registered in 2009 and marketed by Canterra Seeds in Canada and the U.S. It has very upright growth, which makes the variety suitable for direct harvest. Portage is a high-yielding navy bean variety with indeterminate growth, good seed quality and early maturity (Table 1). Portage is adapted to the Red River Valley of Manitoba. Its average yield was 21.3% higher than Envoy, while their maturity is similar. AAC Portage was the first navy bean variety in western Canada to be developed that has partial resistance to CBB. More information can be found in the publication, *Portage common bean* in CJPS (https://doi.org/10.4141/cjps2010-015).

CR10875-6-2 CRANBERRY BEAN

CR10875-6-2 was supported for registration in 2020, but the commercialization process was delayed by the COVID-19 pandemic. CR10875-6-2 is a high-yielding cranberry bean line with an upright, determinate bush growth habit, good lodging resistance, good seed quality and disease resistance. In the long-season, wide-row dry bean cooperative registration trials over 16 station-years, the average yield of CR10875-6-2 was 152% of Etna. The seed size of CR10875-6-2 was similar to Etna and the average maturity of CR10875-6-2 was two days later (Table 1). CR10875-6-2 is resistant to anthracnose (race 73), while Etna is susceptible, and CR10875-6-2 and Etna had similar resistance to white mould and CBB (Table 2).

Table 2. Disease evaluation of AAC Scotty, Portage, CR10875-6-2, S09-27C compared to the respective check cultivars* in the long-season, wide-row dry bean cooperative registration trials.

Cultivar	White Mould Nursery Rating[a]		Anthracnose Rating[b]		Common Bacterial Blight Field Rating[c]	
	Severity (1–5)	Incidence (%)	Race 73 (0–9)	Race 105 (0–9)	Severity (1–5)	Incidence (%)
AAC Scotty	1.5 A	26 A	0.1 A	0.1 A	3.7 A	42 A
Etna*	1.3 A	20 A	7.5 B	7.1 B	3.9 B	49 A
Portage	1.3 A	21 A	6.3–9.0 B	8.5–9.0 A	2.0 B	17 B
Envoy*	1.6 A	34 A	0–0.3 A	8.5–9.0 A	5.0 A	80 A
CR10875-6-2	1.7 A	27 A	0.5 A	6.7 A	3.5 A	42 A
Etna*	1.9 A	27 A	7.2 B	7.2 A	3.8 A	50 A
S09-27C	2.6 A	56 AB	0.7 A	8.5 A	3.0 A	13 A
Envoy*	2.2 A	58 A	0.1 A	6.5 A	3.8 B	54 C
T9905*	2.5 A	45 B	9.0 B	8.8 A	3.2 A	38 B

Means within a column not sharing an uppercase letter differ significantly at the $p < 0.05$ level according to Fisher's LSD test.

[a] White mould severity: 1 = healthy plants and 5 = dead plants; the incidence was rated as the percentage of plants with symptoms at maturity. [b] Anthracnose seedling resistance: 0 = no symptoms and 9 = 90% of veins discoloured.

[c] Common bacterial blight (CBB) severity: 0 = no symptoms, 1 = <5%, 2 = 5–10%, 3 = 10–25%, 4 = 25–50% and 5 = 50–100% leaf area consumed by a single lesion. The incidence of leaves with CBB symptoms (percentage of leaves infected) and CBB severity were rated before maturity according to Mutlu et al. (2005) in Plant Breeding 124: 282-287.

AAC Portage

S09-27C NAVY BEAN

S09-27C was also supported for registration in 2020, but the commercialization process was delayed by the COVID-19 pandemic. S09-27C is a high-yielding navy bean line with an upright and indeterminate growth habit, good lodging resistance, good seed quality, intermediate maturity and is adapted to southern Manitoba. In the long-season, wide-row dry bean cooperative registration trials over 13 station-years, the average yield of S09-27C was 145% of Envoy and 84% of T9905. The average maturity of S09-27C (97 days) was two days later than Envoy but three days earlier than T9905. S09-27C had better resistance to CBB than the checks and it is resistant to anthracnose (race 73), the same as Envoy, while T9905 is susceptible. ■

The On-Farm Network Investigates Next-Level Nitrate

Megan Bourns, Agronomist – On-Farm Network, MPSG

THIS SPRING, AS soil test results were rolling in from trial fields, an unusual number of fields tested high to very high for residual nitrate in the top 24 inches. In most cases, the farmers could not explain the high nitrate, and there were even fields testing high in the spring that had been within the normal range for pulses and soybeans when sampled in the fall of 2020. Asking around and gathering information as to why this might be occurring, it became clear that we do not have reliable answers about why nitrate was so high in these fields and what might happen to those nitrate levels over the growing season. So, we set out to investigate this through the On-Farm Network (OFN). We picked 11 trial fields where we established a microplot to track nitrate in the top 24 inches every two to three weeks during the growing season. The idea was to gather some preliminary information about these high nitrate conditions to hopefully develop more targeted questions about gaps in our knowledge moving forward.

While there are a lot of data points to digest, the main takeaway message is that nitrate levels in the top 24 inches did decline over the growing season (Figure 1). The decreases at each microplot ranged in magnitude from 20 to 149 lbs nitrate/ac. While this is good news in and of itself, another layer of this investigation involves asking questions about agronomic effects of these high nitrate conditions on soybean production. Spring soil test nitrate in the top 24 inches ranged from 35 to 456 lbs/ac across the 11 fields, and average yields ranged from 10 to 45 bu/ac. Interestingly, there was no statistically significant or agronomically meaningful relationship between average yield and spring nitrate in the top 24 inches (Figure 2). In other words, across the fields where we had microplots, the high nitrate levels were not likely the main determining factor for yield outcomes, and we did see yields exceeding 40 bu/ac where spring nitrate was greater than 100 lbs/ac.

In addition to the effect on yield, another pertinent question is the effect of high nitrate on soybean nodulation. Generally, we observed that nodulation was less than agronomically ideal leading up to R1–R2 (<10 active nodules per plant). However, for some fields, nodules seemed to develop later than normal. While this could certainly be an effect of high

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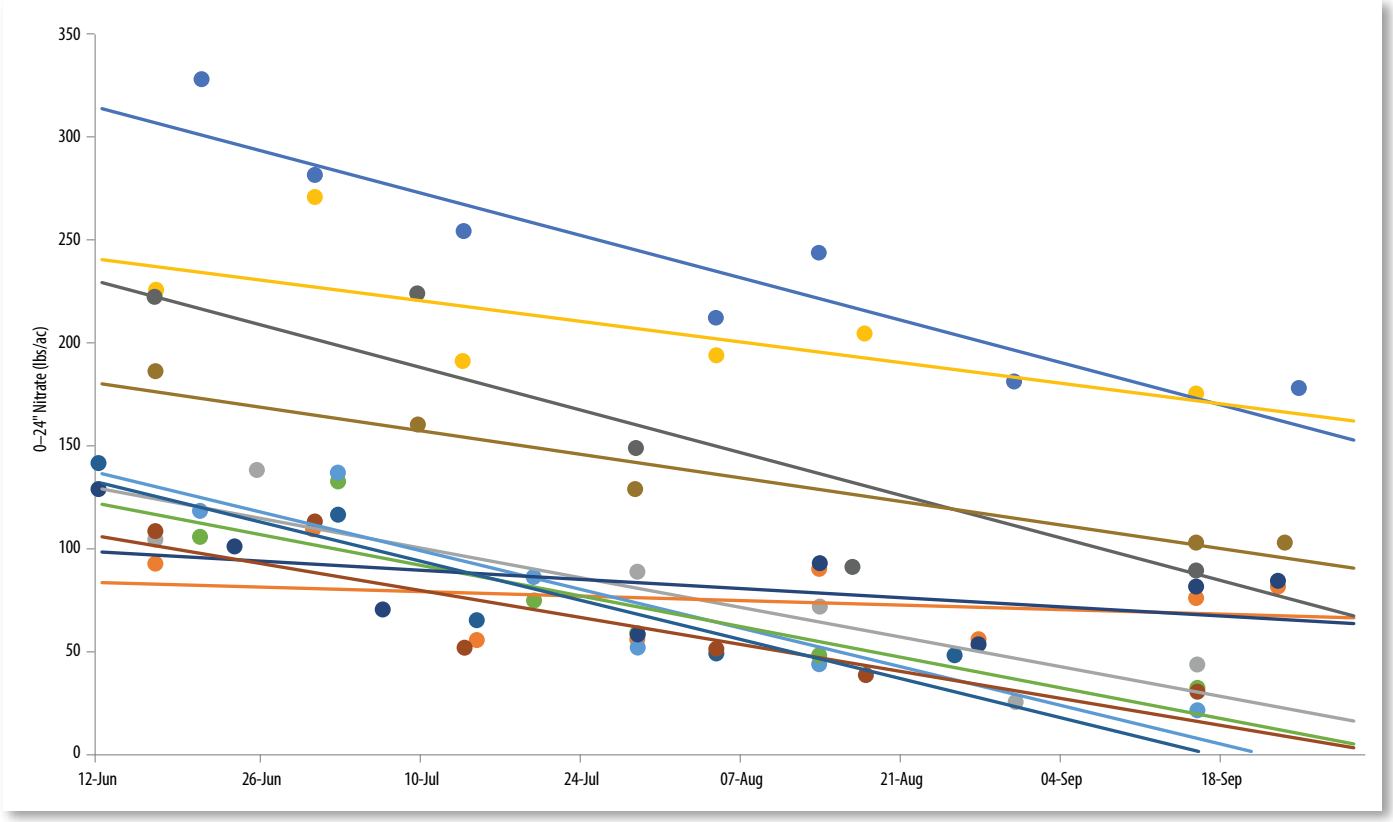
Figure 1. Nitrate levels (0–24 inches) over the growing season. Each colour represents a different microplot site.



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nitrates, we also observed this in other fields where nitrate levels were within normal ranges—likely in response to the dry conditions this season.

So, where does this leave us? The OFN team has some further data investigation to do, exploring the relationship between changes in nitrate and precipitation through the season. The Birch effect is one of the main theories about where the high nitrates came from in the first place. Essentially, the Birch effect is a phenomenon whereby there is a mass death of microbes in the soil, which leads to the release of nutrients from the microbial cells. In this case, a mass microbial death could have been caused by prolonged dry conditions. If this were the case (which we are still investigating, working with our data), we would expect to see more of a change in soil nitrate in the top six inches, where microbial activity dominates, as moisture and heat help the microbial population re-establish. Looking at nitrate changes in the top six inches over the season and how that relates to precipitation events (although they were few and far between in 2021 for the most part) could inform whether the Birch effect was a primary contributing factor to the high nitrate.

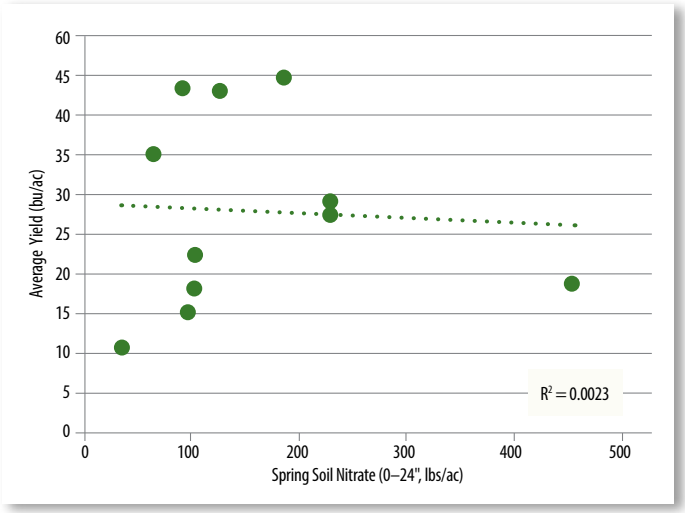
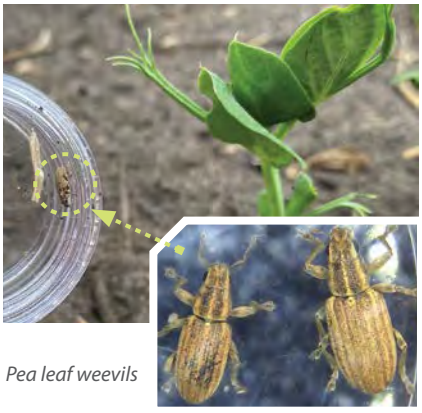


Figure 2. The relationship between spring soil nitrate and average soybean yield at 15 microplots across Manitoba in 2022.

Additionally, we want to conduct a more detailed exploration of field histories. Our initial takeaway from reviewing tillage practices, soil organic matter, soil type, manure history and crop history suggest there is not an obvious link between those factors and high spring nitrate or how much nitrate decreased over the growing season for these fields.

When scenarios like these inexplicably high nitrate levels, pop up as a result of certain conditions, there are always a lot of questions that follow any initial investigation. We will keep you updated on what we learn as data analysis continues! ■



Pea leaf weevils

The Pea Leaf Weevil

An invasive pest of peas and faba beans

Dr. Meghan Vankosky and Dr. Hector Carcamo, Agriculture and Agri-Food Canada

THE PEA LEAF weevil, *Sitona lineatus*, is an invasive pest in Canada. Following its initial detection in southern Alberta in the late 1990s, its range has expanded north and eastward. Pea leaf weevils now occur across all agricultural areas of Alberta (including the Peace River region) and Saskatchewan. It was first detected in Manitoba in 2019 in the Swan River Valley and has since expanded. This fall, adult pea leaf weevils were found in pea and faba bean fields throughout western Manitoba (Figure 1).

LIFE CYCLE

The primary feeding and reproductive hosts of pea leaf weevil are field peas and faba beans. However, adult weevils will feed on a variety of secondary hosts, including clovers, alfalfa, chickpeas and soybeans. Damage to the secondary hosts is not typically economical except at unusually high densities on establishing alfalfa fields. Adult pea leaf weevils emerge from overwintering sites along field margins close to their secondary hosts (e.g., forage alfalfa or clover fields) in the spring. Initially, they feed on secondary host plants before dispersing into fields where field pea and faba bean seedlings are emerging. After arriving in pea and faba bean fields, adults feed, making 'u'-shaped notches along the leaf margins (Figure 2). Within a few days of feeding, adults mate and females begin to lay eggs; weevils are long-lived and individual females may lay over 1,000 eggs from June to August. When the eggs hatch, first instar larvae chew their way into the root nodules of pea and faba bean plants, where they feed on the bacteria that fix nitrogen inside the nodules. Larval feeding damage is generally considered to be more serious than adult damage in

Figure 1. Confirmed locations of pea leaf weevil in Manitoba as of October 2021.

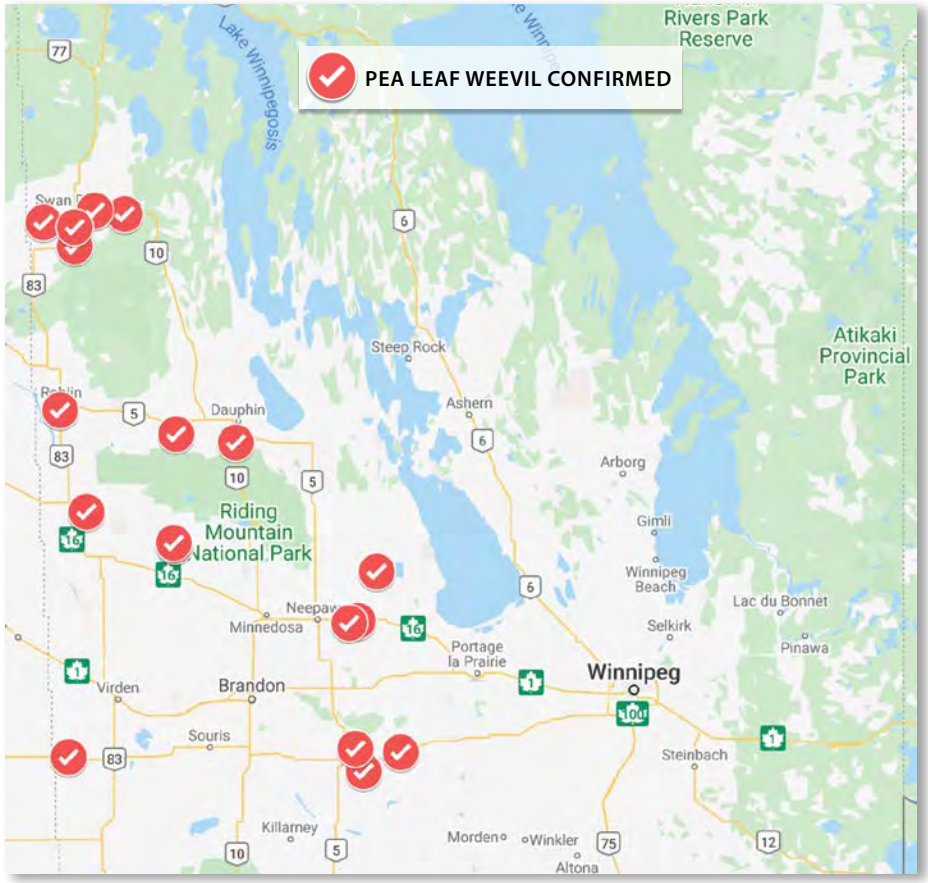


Figure 2. Leaf notching on pea and faba bean seedlings from adult pea leaf weevil feeding.

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terms of yield loss. After completing their development, larvae pupate in the soil and a new generation of adult weevils emerges, usually beginning in late July or early August. New generation adult weevils feed on any remaining green pea and faba bean plants and then disperse to find secondary hosts where they feed until temperatures drop and overwintering begins.

MANAGEMENT OPTIONS

A variety of management options for pea leaf weevil have been studied since its detection in the late 1990s and research projects continue to address pea leaf weevil management. Currently, the best management practice for pea leaf weevil is the use of neonicotinoid seed treatments. The insecticide works systemically to protect seedlings from excessive adult feeding until the seedlings are established. Weevils that consume the insecticide in the foliage are paralyzed for a short time, feed less and lay fewer eggs during the critical vulnerable crop stage compared to weevils that feed on untreated plants. Only about 30% of the adult population dies after consuming foliage from insecticide-treated seed.

In addition to insecticide seed treatments, some foliar insecticides include pea leaf weevil on their labels. However, studies conducted in Alberta and Saskatchewan have found that foliar insecticides do not reduce weevil populations, do not reduce the amount of damage caused by adult or larval weevils and do not protect against yield loss in peas or faba beans. In Alberta and Saskatchewan, it has been recommended that farmers consider applying insecticide seed treatments if they plan to plant peas or faba beans in regions with high population densities in the previous growing season. This is inferred from high levels of foliage damage (more than 30% of seedlings with damage on the clam leaf for peas and 15% for faba beans) observed in spring. Based on surveys conducted in the spring, information about the distribution and estimated density of adult pea leaf weevils is available provincially and from the Prairie Pest Monitoring Network (prairiepest.ca), usually in January. A protocol for scouting fields for adult weevils in the spring is available from the Prairie Pest Monitoring Network.

There are also some options for cultural control of pea leaf weevil. Because the earliest planted pea fields tend to be most damaged, delaying planting may reduce the risk of damage (so long as crops are not planted too late as to impact yield). Fields with very high levels of soil nitrogen, such as manured fields, may have a lower risk of yield loss. However, supplementing nitrogen post-seeding to faba beans is not recommended because the amount of fertilizer needed would be too high and cost-prohibitive. Management options that use trap crops and pheromone traps to attract and kill adult weevils in the spring and fall are currently under investigation in Alberta. The impact of predation on pea leaf weevil populations is also being investigated, with a focus on generalist ground beetle species that are often encountered in field pea and faba bean fields.

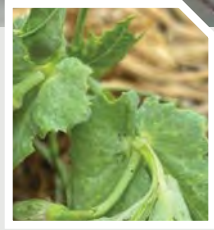
Photo: John Gavloski

Ground Beetle

For advice about managing pea leaf weevil in Manitoba, farmers are encouraged to consult with John Gavloski from Manitoba Agriculture and Resource Development. ■

Field Pea Scout ANSWERS

It's important to capture weevils for identification while we try to determine the full range of pea leaf weevil in Manitoba. Other weevils in the same genus will cause similar leaf notching damage, but only the pea leaf weevil will negatively impact pea and faba yields.



Leaf Notching

A – Alfalfa curculio *(Sitona lineelus)* hosts are alfalfa, sainfoin, cicer milkvetch and native vetches. They can be found feeding on above-ground parts of pea and faba bean plants in spring and cause the characteristic leaf notching associated with weevils. Since these pulses are not their host crops, they will not lay eggs in fields. This means their larvae will not be feeding on nodules below ground causing yield loss as with pea leaf weevils. Alfalfa curculios are smaller than pea leaf weevils (3 to 4 mm) and have light grey bands along the edges of their bodies. Weevils can be sent to MPSG or Manitoba Agriculture for proper identification.

B – Pea leaf weevil *(Sitona lineatus)* is an emerging pest of peas and faba beans in western Manitoba. They have been identified as far east as Gladstone and Holland (see page 49). They overwinter in perennial legumes and move into their preferred hosts, peas and faba beans, in spring. Females start laying eggs once they begin feeding on these crops. Eggs then hatch into larvae that feed on root nodules below ground, resulting in yield loss. Pea leaf weevils are larger than alfalfa curculios (5 mm) and have three light coloured stripes running from head to abdomen. Scout for pea leaf weevils by looking for leaf notching in spring, or in fall to plan for next year. Try to capture weevils for proper identification. At current low population levels, insecticidal control is not likely to be economical.

Ten Years of On-Farm Testing at MPSG

on-farm network
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WHILE THE ON-FARM Network (OFN) wouldn't officially launch until 2014, back in 2012 Manitoba Pulse & Soybean Growers (MPSG) initiated 10 soybean seeding rate trials on farms across central and eastern Manitoba. Since then, the OFN has expanded to include 418 trials, 22 trial types, four crops and all regions of agro-Manitoba. Here's a snapshot of those trials to date. Results of these on-farm trials can be found at manitobapulse.ca/on-farm-research-reports, along with a fully searchable and filterable map of the trials.

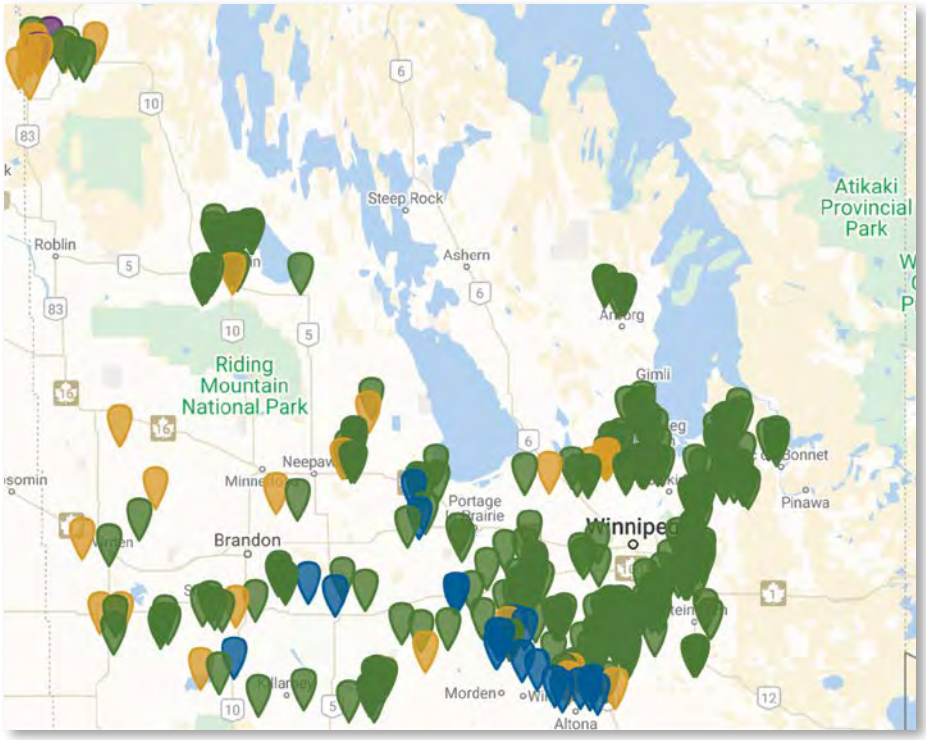
The number of on-farm trials MPSG and farmer participants collaborated on steadily increased until 2018 and has since levelled out at 50 to 60 trials per year. In recent years rather than focusing on increasing the size of the On-Farm Network, MPSG has intensified the amount of data collection, measurements and observations taken at each trial. This helps inform why we do or do not see yield responses from these trials and provides a more complete story about what is going on in each field.

Among the four crops, 11 different types of research questions—*does this product or practice improve my bottom line?*—have been asked since 2012. The most common trials have been testing foliar fungicides (either treated vs. untreated or double vs. single applications), seeding rates and inoculant practices (double vs. single and single vs. none).

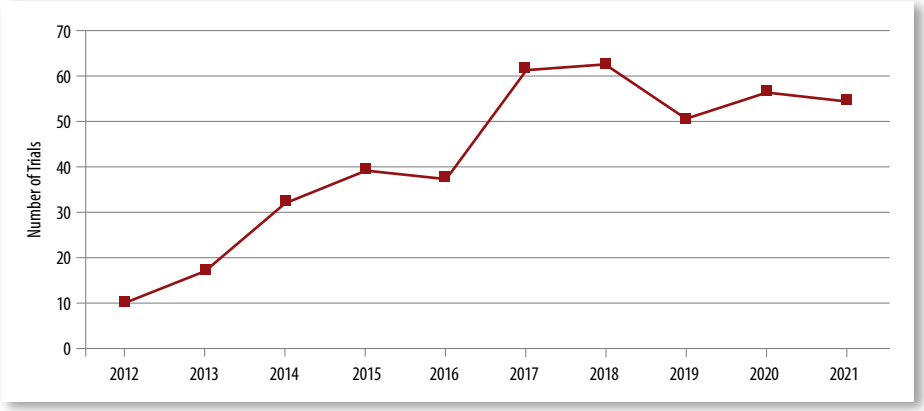
Number of each trial type tested in on-farm trials since 2012.

Trial Type	# of Trials	% of Trials
Foliar Fungicide	116	27.8%
Seeding Rate	106	25.4%
Inoculant (2x vs. 1x, 1x vs. none)	87	20.8%
Seed Treatment	44	10.5%
Fertility	28	6.7%
Row Spacing	18	4.3%
Biologicals	11	2.6%
Tillage	3	0.7%
Rolling	3	0.7%
Insecticide	1	0.2%
Residue Management	1	0.2%

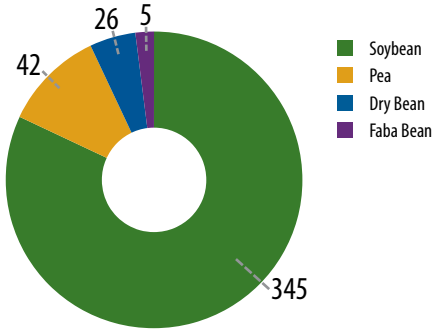
Map of on-farm trials conducted by MPSG since 2012. This map is available at manitobapulse.ca/on-farm-network and is a fully searchable and filterable way to view trial results across Manitoba.



Number of on-farm trials conducted annually by MPSG and farmer collaborators from 2012–2021.



Proportion of on-farm trials by crop type (2012–2021).



Recipe Corner

Spiced Chickpea Fritatta

Servings: 4–6 | Prep time: 10 minutes | Cook time: 20 minutes | Total time: 30 minutes

Ingredients

- 8 large eggs
- ¼ cup milk
- 1 tbsp canola oil
- 1 cup cooked chickpeas – *canned can be substituted*
- ½ cup feta cheese
- ½ cup chopped raw spinach
- ¼ cup chopped prosciutto
- ½ cup diced red onion
- 1 tsp Dijon mustard
- 1 tsp ground cumin
- ½ tsp smoked paprika
- ¼ tsp ground cayenne
- ½ tsp ground coriander

Method

Preheat oven to 350–375°F.

1. Combine the eggs, dijon mustard, milk and whisk until well combined. Season with salt and pepper and set aside.
2. Place cast iron skillet or heavy bottom pan on medium heat and add the canola oil. Add the red onion and sweat for 1–2 minutes.
3. Add chickpeas, prosciutto, spices and sauté an additional 2–3 minutes.
4. Add the egg mixture and gently shake the pan to distribute. Sprinkle with the feta, spinach, and bake 15–20 minutes or until the eggs are set.
5. Serve with salad or toast or just as is!

Recipe featured on Great Tastes of Manitoba – www.greattastesmb.ca

Chef Sean Audet joins Great Taste of Manitoba host, Dez Daniels, to present *Bean there. Done that!*

Great Tastes of Manitoba gets 'Audeted'

Sean Audet and Manitoba Pulse & Soybean Growers (MPSG) first met in 2016, the International Year of Pulses. As part of the year-long celebration, MPSG, with the help of Sean, put on a delicious pulse-themed dinner at Hawthorn Estates in East Selkirk.

Earlier this year, Sean agreed to become MPSG's newest chef on Great Tastes of Manitoba (GTOM). We think he's a perfect fit.

Sean is a red-seal chef, a photographer, a stylist, a marketing expert and an all-around great person. His beginnings are in the sciences. Organic and bio chemistry, to be specific. His drift towards the culinary began when the restaurant job he took to pay for his studies awoke in him something new – a love of cooking. Sean had a eureka moment, realizing that pursuing food science would allow him to blend his two loves.

Sean was accepted into the Culinary Institute of Canada, which led him to restaurant jobs in Saskatoon, BC and Manitoba, where he taught Pastry Arts at Red River College. Later, he would become the school's research and development chef.

Sean brings a tremendous amount of creativity to his role as MPSG's GTOM chef. Welcome, Sean! Visit seanaudet.com for more information.

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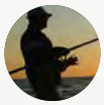

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