MANITOBA Pulse Soybean GROWERS

pulsebeat

Issue 97 • Spring 2023

Farmers Without Borders

Case for a Great Plains Agricultural Network

p. 20

Industry-Driven Innovations – A Bright Light for Agriculture in Manitoba

p. 24

The Bean Report

2022 Disease Prevalence and Management Tools

p. 36

Grain and Forage Legumes in Sustainable Crop Production

p. 28

Role of Annual Legumes in the Low-Carbon Economy

p. 26

WHAT GOOD IS IT IF IT'S NOT THERE WHEN YOU NEED IT?

Count on our new pre-seed herbicide for pulses.

Lots of things can let you down. We won't. New Voraxor® Complete herbicide takes out tough broadleaf weeds with the most consistent[1] pre-seed burndown available. It also provides residual activity, to help make sure they stay out of your pulse fields. Powered by the chemistries you know and trust, including Kixor® and Zidua® SC, Voraxor Complete raises the bar with the innovative new active, Tirexor.® So you know you can count on it to perform when you need it.

Visit **agsolutions.ca/VoraxorComplete** to learn more.

Voraxor® Complete
Powered by **Tirexor®** Herbicide

BASF
We create chemistry

[1] Source: BASF internal trials, 2020, n=10.

Always read and follow label directions.

Publisher	*Manitoba Pulse & Soybean Growers*
Editor	*Toban Dyck, Burr Forest Group*
Associate Editor	*Desirae Warkentin*
Design and Production	*Burr Forest Group*

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

Publications Mail Agreement #40016070

RETURN UNDELIVERABLE CANADIAN ADDRESSES TO:

Manitoba Pulse & Soybean Growers
P. O. Box 1760, Carman, Manitoba R0G 0J0

204.745.6488 Fax 204.745.6213
Email info@manitobapulse.ca

Pulse Beat is the official journal of and published by Manitoba Pulse & Soybean Growers (MPSG) – a farmer organization funded by sales of pulse (beans, peas, lentils and faba beans) and soybean crops grown in the province of Manitoba. Circulation is approximately 4,000 distributed to farmers, government, researchers and industry involved in pulses and/or soybeans.

MEMBER PRIVACY POLICY

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 Melissa Denys at 204.745.6488 or email melissa@manitobapulse.ca.

In This Issue

Manitoba Pulse & Soybean Growers 2023 Board of Directors and Staff

ELECTED FARMER DIRECTORS

Chair – Melvin Rattai – *Beausejour*
Vice Chair – Brendan Phillips – *Hartney*
Alex Burgess – *Minnedosa*
Rob MIsko – *Roblin*
Ben Martens – *Boissevain*
Bryce Pallister – *Portage la Prairie*
John Preun – *St. Andrews*
Frank Prince – *Waskada*
Garrett Sawatzky – *Altona*
Ernie Sirski – *Dauphin*

STAFF

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

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

Finance and Member Relations Administrator – Robyn Swark – *robyn@manitobapulse.ca*

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

Communications Coordinator – Kate Menold – *kate.menold@gmail.com*

Research Project Manager – Cassandra Tkachuk – *cassandra@manitobapulse.ca*

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

Agronomist – On-Farm Network – Vacant

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

Production Specialist – East – Jennifer McCombe-Theroux – *jennifer@manitobapulse.ca*

Message from Board Chair

Melvin Rattai, Chair, MPSG

I BELIEVE THE 2023 growing season and the entire year is going to be great.

As I write this, I'm staring out of my window at a yard covered in snow. You know what I am taking about. Your farms were also likely battered by storm after storm after storm. Every weekend seemed to bring in a new weather system.

Last spring was quite late. Everything seemed to be a month behind schedule. Naturally, we think of spring 2022 as an anomaly, and that the likelihood of this year being similar is too slim to take seriously. I cannot speak to how much snow you have left on your yard, but there is a lot on our yard and very little, if any, has melted. I'm starting to brace myself.

On my farm, which I run with my family, we have issued a challenge to ourselves. In 2023, we are pushing ourselves to achieve a farm-wide soybean average of 50 bu/ac. While we know that the weather could make or break this for us, we will put in the legwork to make sure our soybeans have the best chance possible.

- We will give extra attention to our seed beds, ensuring our fields are as smooth as possible
- We will give extra attention to seeding depth
- We will give extra attention to the available phosphate levels on our fields and plant accordingly
- We will also be attentive to spray timing, realizing that this element, too, can impact yield

In mid-March of this year, a small delegation from Manitoba Pulse & Soybean Growers (MPSG) met with the Manitoba Agricultural Services Corporation (MASC) to discuss insurance coverage of the crops we represent.

We discussed with them addition of a new coverage category specifically related to growing soybean varieties grown for human consumption markets, which usually command a premium. We will keep you up to date on our progress on this file.

We are continually encouraged by the amount of our farmer members who utilize our On-Farm Network research and programs. It is apparent that Manitoba farmers have an interest in learning how to conduct their own research on their own farms, and that is very encouraging.

As always, the MPSG Board of Directors is impressed with the excellent work staff is doing on behalf of Manitoba's farmers, focusing on research and ensuring that research gets put to work on farms in all of Manitoba's growing regions.

Have a great planting season and stay safe! Take care of yourselves, physically and mentally, and stay focused on the things that matter in this life. ■

— Melvin

SOYBEAN SCOUT

What's impacting these soybean leaves as the crop starts to mature?

Find the answers on page 51

Message from Executive Director

Daryl Domitruk, Executive Director, MPSG

BALANCE IS TOUTED as the ideal state of one's outlook and actions. Generally, balance is good. A balanced point of view is associated with wisdom. A balanced crop rotation has many attributes. In its less desirable form balance can be a cover word for indecision or a lack of commitment; what we might call sitting on the fence. Working for a farm organization you are taught the difference between balance and sitting on the fence.

Farm organizations are called on to make decisions that avoid the fence. At the same time, we're compelled to gather evidence to support our decisions. That said, organizations need to be mindful that evidence can be inconclusive. We also know gathering evidence takes time and energy and can quickly reach a point of diminishing returns.

Having learned from their farmer owners, farm organizations like MPSG do not dwell on evidence to the point of sitting on fences. We strive to maintain an operating culture where time on the fence is brief. The visit consists of reviewing evidence, mixing in some intuition, rendering a decision, and moving on. If the decision isn't perfect, we're prepared to fix it next time.

I admit this crisp and efficient form of decision making is counterintuitive to many science-types like me. It doesn't seem balanced at all. To me balance is achieved by an exhaustive review of evidence that ultimately tests a hypothesis. My hypothesis, hopeless as it turns out, is that I can issue air-tight, defendable decisions on any question faced by the organization. If this means an extended perch on the fence, so be it.

I know this amuses and even frustrates our farmer directors. They're comfortable making gut calls that keep things moving at pace with the prevailing conditions. For them it's better to step off the fence on their own terms rather than risk being knocked to ground by circumstances. Farmer directors intuitively know when to pull the trigger on a decision that effects the entire organization. It's from them I've learned balance is embodied in forthright decisions made by people who confidently combine evidence with intuition – not letting either one become dominant.

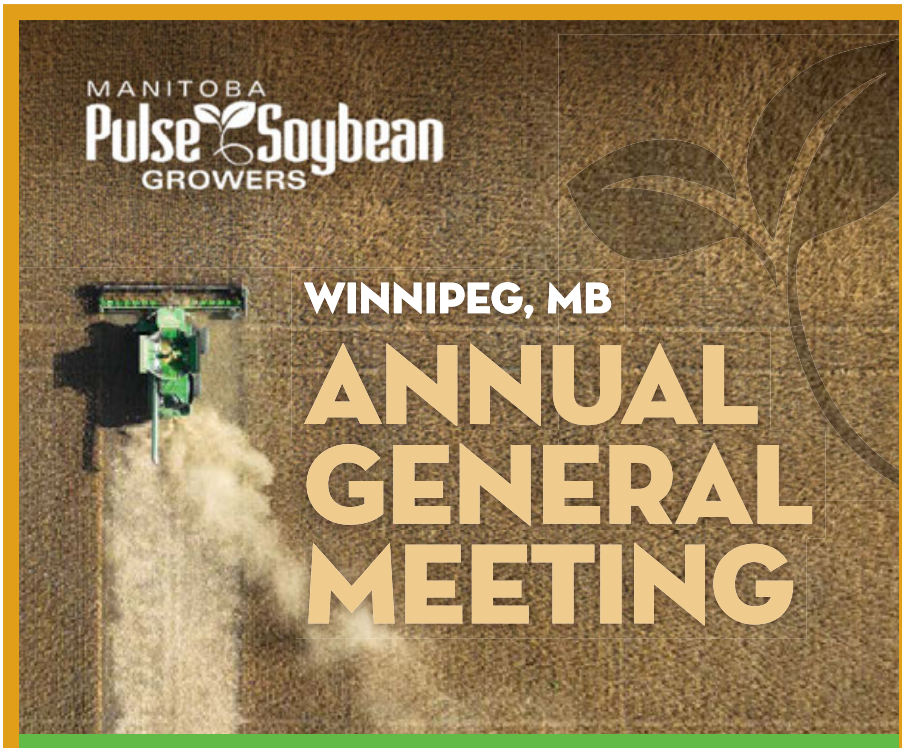
Most of the time my need for evidence (and corresponding lack of intuition) balances nicely with the board's gut calls. What emerges is a responsible approach to investing levy funds to generate the best possible return for members. Questions of balance arise every day. When funding research, we've decided that levies collected from soybean sales ought to carry part of the load for improvements to dry beans and peas. We've reasoned that a vibrant multi-crop legume industry is valuable to all and worth pursuing. Similarly, with demands for extension in every district of Manitoba, we've long since parted with attending to just the highest acre regions. As much as possible we engage with levy-paying members on their own turf. It consumes a bit more time and money, but our sense of balance says a little travel time serves our core belief that all members are owed service regardless of where they farm.

The current state of farming calls for balance in commodity group decision making. There's an ever-changing mix of opportunities and threats driving the need for decisions. Those attending the annual general meeting in February saw how we've balanced investments in very practical research with forays into more vague upstream investigations. We figured that to solve big expensive problems like root rot and drought tolerance we need to take some risks and fund discoveries in the lab.

Our crops exist in distinct supply chains. These days each supply chain is addressing the threat/opportunity of sustainability in its own way. Our sense of balance guides us to capture each crop-specific opportunity while simultaneously extinguishing the threats. Another distinct example is emerging in the northern plains marketplace. Here the soybean industry is rapidly evolving. A recent Soy Canada promotional event revealed opportunities in the food market in Asia. At the same time, the ramping up of renewable fuel soybean crushing in North Dakota may present opportunities for moving soybeans south. What we really wanted was large scale crushing in Manitoba. Can we have it all? We'll be watching these developments and assigning resources according to the balance of opportunity we perceive.

I hope you have attended some of our events, spoken with our agronomists, signed up for an On-Farm Network trial, read our magazines, or accessed our on-line resources. I invite you to review what you see and hear and let us know if we've got the right balance or if we're sitting on too many fences. ■

— Daryl



FEBRUARY 15, 2023

Once again, MPSG held their Annual General Meeting as part of the Crop Connect conference, which took place February 15 & 16 in Winnipeg, MB. This year's attendees heard reports from board chair Melvin Rattai, executive director Daryl Domitruk and research project manager Cassandra Tkachuk. The board had four vacancies and three were filled by incumbent candidates Melvin Rattai, Ernie Sirski and Frank Prince. MPSG also said farewell to board director Bryce MacMillan, who is stepping away from the board after two terms. Bryce served as chair on the Governance-Human Relations committee and sat on the Communications and Member Relations committee.

Manitoba Pulse & Soybean Growers 2023 Committees and Representatives

MPSG COMMITTEES – *The first named is chair*

Executive – M. Rattai, B. Phillips, E. Sirski

Governance/HR – F. Prince, G. Sawatzky

Policy – A. Burgess, B. Pallister, E. Sirski, J. Preun, M. Rattai, R. Misko

Finance/Audit – J. Preun, B. Phillips, M. Rattai

Resolutions – A. Burgess, R. Misko

Nominating – A. Burgess, R. Misko

Communications/Member Relations – G. Sawatzky, F. Prince, B. Martens, B. Pallister, M. Rattai, R. Misko

Market Development – A. Burgess, B. Pallister, E. Sirski, J. Preun, M. Rattai, R. Misko

Research – G. Sawatzky, F. Prince, B. Martens, B. Pallister, M. Rattai, R. Misko

MPSG REPRESENTATIVES

Canadian Grain Commission Pulse Sub-Committee – G. Sawatzky

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

Keystone Agricultural Producers
- **General Council** – A. Burgess
- **Grains Oilseeds Pulse Sub-Committee** – A. Burgess

MCVET – D. Domitruk

Prairie Recommending Committee for Pulse and Special Crops – D. Domitruk

Pulse Canada – B. Martens, J. Preun

Soy Canada – M. Rattai, F. Prince

January 17–19, 2023 **Brandon, MB**

After a two-year hiatus, Ag Days returned to the Keystone Centre in Brandon, MB. This year, MPSG hosted a booth as a place for farmers to come ask staff questions. MPSG also took part in Ag in the Classroom's Ag Days Adventure. The booth played host to grade 7 and 8 students from Brandon and the surrounding area, who came to learn about what pulses are and why they are an important crop for the environment. MPSG sponsored a session of speakers on topics ranging from soybean production to sustainability.

EXPLORE A NEW FRONTIER OF EXCEPTIONAL GROWTH.

TagTeam® BioniQ®

CHICKPEA | FABA BEAN
LENTIL | PEA

NexusBioAg's portfolio of products are rewriting the rules on how much your acres can produce.

TagTeam BioniQ combines up to five biologicals to boost growth and yield potential across all your pulse crops, while maximizing the effectiveness of your inputs.

Let the results in the field energize the future of your farm.

Note: Lentil and pea formulations contain 5 biological actives. Chickpea and faba bean formulations contain 4 biological actives.

SUSTAIN YOUR LEGACY.

nexusbioag.com
Contact your ag dealer to learn more.

NexusBioAg

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

On-Farm Network Appreciation Dinner

DECEMBER 13, 2022 | WINNIPEG, MB

MPSG was joined by Manitoba Crop Alliance (MCA), Manitoba Canola Growers Association (MCGA) and Canola Council of Canada (CCC) to host the On-Farm Network Appreciation Dinner. MPSG's On-Farm Network Agronomist Leanne Koroscil presented MPSG's results from 44 on-farm trials to 103 attendees. Last year's trials included 22 soybean trials, 20 field pea trials and two dry bean trials.

View from the Field

Ian Kirby, On-Farm Network Technician

DIGGING DEEPER BELOW THE SURFACE

Our Manitoba landscape offers an expanse of varying elevations, slopes and soil textures, often within the same field. To boot, weather systems remain unpredictable. We've all experienced a heavy rain in one field, while another field just a mile down the road remained bone dry. Last season brought with it a range of soil moistures, from extensive flooding in the spring to drier conditions in the fall. Understanding what that meant for your fields and the nutrients within is best determined though soil tests. Considering the costs of spring inputs, the price tag of soil tests can be economical and sustainable in the long run if it's paid off by savings from reduced fertilizer applications.

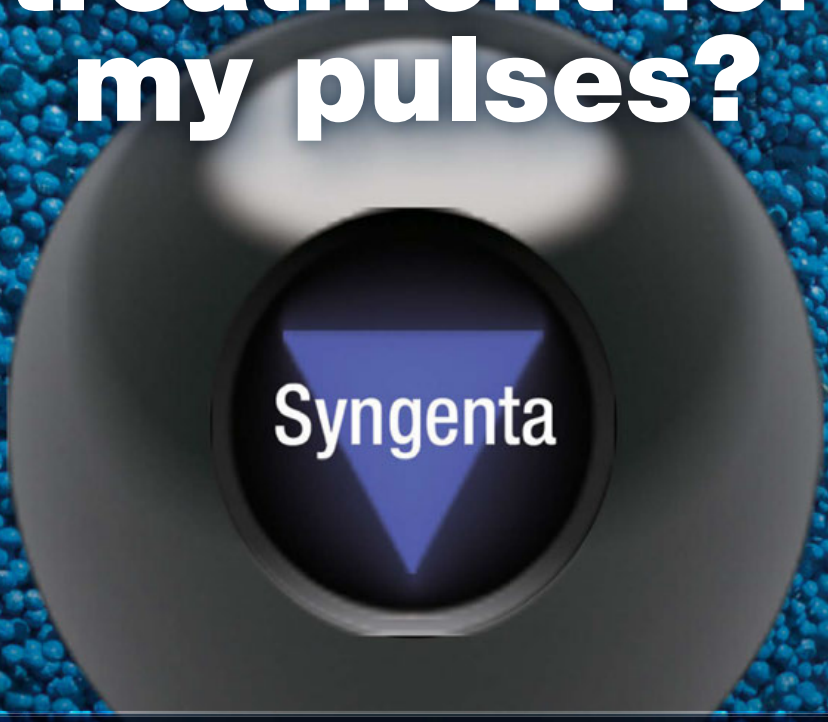
Out with the old...

in with the new.

This year, Manitoba Pulse & Soybean Growers (MPSG) is levelling up their soil sampling methods with a new truck-mounted soil probe, increasing their capacity to provide soil measurements and yield results to farmers conducting on-farm trials. The additional soil sample analyses and resulting data will provide MPSG and trial participants with information on crop response to in-field treatments. Soil sampling remains an important practice to accurately understand what is going on below the surface, and the On-Farm Network looks forward to increasing efficiency with the truck-mounted soil probe.

If you're interested in learning more about the On-Farm Network, contact Ian Kirby at **204.751.0135** or **ian@manitobapulse.ca.**

Where can I find a trusted seed treatment for my pulses?



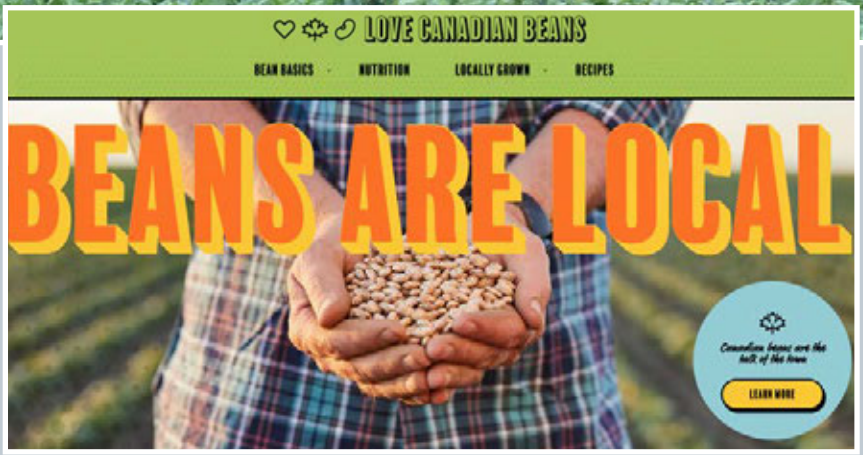
THE CHOICE IS CLEAR

Seedcare™

syngenta®

For more information, visit Syngenta.ca, contact our Customer Interaction Centre at 1-87-SYNGENTA (1-877-964-3682), or follow @SyngentaCanada on Twitter.

#LoveCDNBeans Campaign



In 2022, MPSG joined sister pulse organizations Alberta Pulse Growers, Ontario Bean Growers and Pulse Canada, in a campaign to encourage consumers to buy more Canadian-grown dry beans. The campaign was launched in September 2022 on Facebook, Instagram, Pinterest and YouTube, and a website was launched to host recipes, nutritional information and video content. The website also hosts information about dry bean farmers across Canada.

The idea behind the campaign is to better understand consumers' attitudes about dry beans and help educate them about who grows them and how to use them in everyday meals. Dry beans are an excellent source of iron, protein and many other essential nutrients. They are also proving to be a very economical option for Canadians looking to stretch their dollar.

One of the goals of the campaign is to highlight the versatility of dry beans. It provided us with the chance to partner with other Canadian commodities and to show that beans are also an excellent complement to many other high-quality Canadian-grown products.

While #LoveCDNBeans wrapped up in March 2023, Pulse Canada is exploring opportunities to continue this campaign.

Say Hello to MPSG's 2023 Summer Students

Mikayla Melnick

My name is Mikayla Melnick, and I am so excited to join MPSG for a second summer season and to get out into the field again. I am from Qualicum Beach, BC and just finished my bachelor's degree from the University of Guelph. I majored in biomedical and environmental toxicology and minored in agriculture. Last summer I enjoyed investigating whether fungicide applications affected microbial activity within the soil of pea fields. I look forward to learning more about all things pulses and soybeans. I have some big adventures planned for the summer 2023 including seeing more Manitoban ford crossings and a few ultramarathons in the BC mountains!

Ashlyn Kropp

My name is Ashlyn Kropp, and I can't wait to work for MPSG this summer. I grew up in Morden, Manitoba and I'm currently pursuing my Bachelor of Science in Agriculture, majoring in plant biotechnology at the University of Manitoba. This summer, I look forward to learning more about how crop research and data collection works through the On-Farm Network, which will teach me robust research practices and build my agricultural knowledge. I'll be gearing up to participate in the 6k Mud Hero obstacle course in Grand Beach this summer among enjoying lots of walks with my dog in the warm weather.

MPSG's 2022–2023 Scholarship Recipients

Manitoba Pulse & Soybean Growers (MPSG) has awarded two University of Manitoba agriculture students with bursaries for the 2022–2023 academic year. Jaden Van Den Bussche was the recipient of $1,000 through the MPSG Degree Scholarship, and Seun Bakut was awarded $1,000 through the MPSG Diploma Scholarship. Supporting students interested in pursuing an education in agriculture is a priority for MPSG and its farmer members, and we look forward to seeing how Jaden and Seun, will undoubtedly improve the industry.

Meet Jaden Van Den Bussche: I was raised in Treherne, Manitoba and I am in my third year of a plant biotechnology degree. I plan to use my degree to work in agricultural research. Agriculture is an incredible industry because it involves science, logistics, and marketing to make the system function—understanding this complex system is a never-ending source of knowledge looking to be explored. This Manitoba Pulse & Soybean Growers (MPSG) scholarship has reduced my cost of tuition and empowered me to attend events hosted by the university, meet new people, and begin networking with other members of the agriculture community. Thanks, MPSG and its farmer members for the opportunity!

Meet Seun Bakut: I am originally from Jos, Nigeria, now pursuing my Diploma of Agriculture, with a major in General Agriculture. Agriculture fascinates me because it's a multidimensional space involving plants, soil, the environment, humans, and animals all working together in sync. I am fortunate for the many hands-on learning experimental opportunities to learn about agriculture throughout my program, like visiting a bison ranch! I will be graduating this spring, after which I hope to work as a research assistant while working towards establishing my own operation. I am so thankful to be supported by Manitoba Pulse & Soybean Growers in my academic pursuits.

Price Expectations and Acreage Possibilities

Chuck Penner, Owner, LeftField Commodity Research

THE 2021 DROUGHT has a long tail. The extremes of 2021/22 had long-lasting impacts on the market that are hanging on. Bad experiences with grain contracts that year are causing farmers to view 2023/24 contract offers with more caution and scrutiny. And how well crops performed under 2021 drought conditions continues to be part of the 2023 crop decision process, especially in parts of the prairies that are still dry.

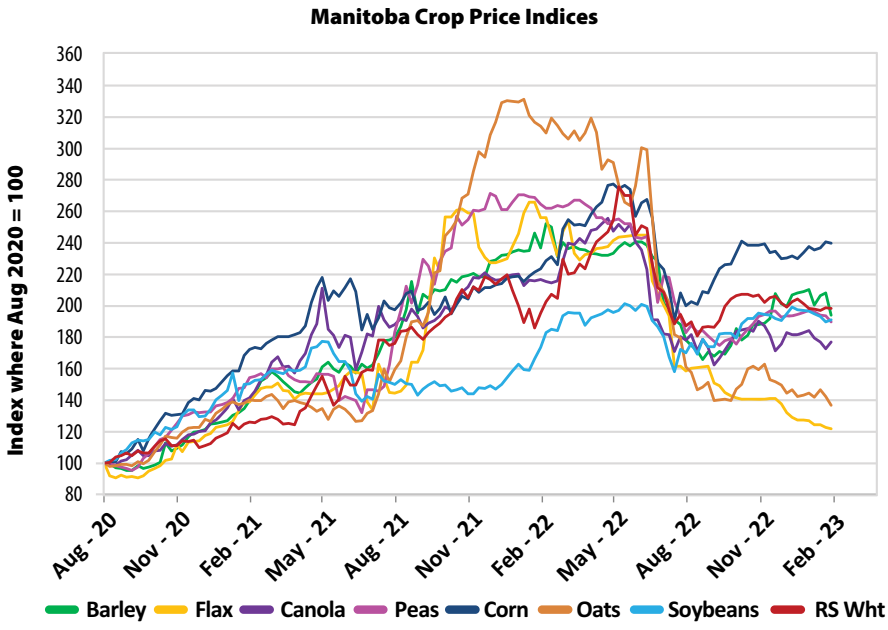
One of the biggest impacts of 2021/22 on markets has been the change in price expectations. Even though most realize the extreme highs of that year won't show up again (without another drought), there seems to be an idea (not just among farmers) that new price ranges are in effect. Of course, prices will always cycle up and down, but it's expected that this will happen at higher levels than before the drought.

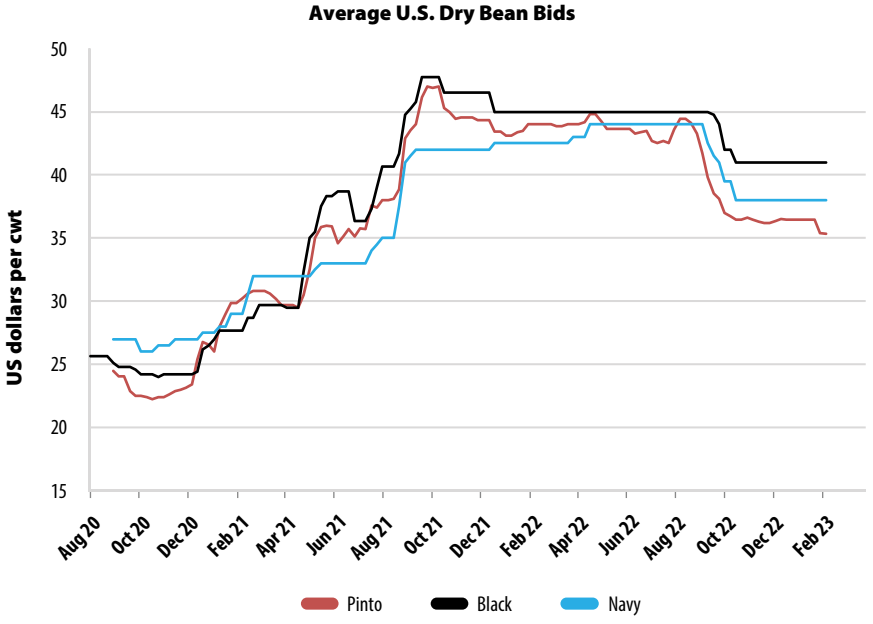
It may be too soon to conclude that this is a new era, but these higher price expectations have created "floor prices" as farmers tend to stop selling if prices slide too far. As such, these expectations can be partly self-fulfilling. And of course, the rising cost of producing a crop means higher returns are needed.

This hangover from the 2021/22 marketing year doesn't just affect marketing the 2022 crop; it's also having an effect on acreage decisions for 2023. While prices are only one factor in the decision-making process, price performance after the 2021/22 highs is certainly a strong influence.

The Manitoba Crop Price Indices chart is busy, but shows all kinds of interesting information. For example, the upward trend in prices started in August 2020, making it clear that all crop markets were strengthening well before the 2021 summer drought. Of course, that's when prices for most crops really took off.

Compared to August 2021, oats were the superstar of 2022 but peas also performed very well. Meanwhile, soybean prices didn't respond to the drought in Western Canada as prices were largely determined by events in the U.S., South America, and China.





When it comes to the 2023 acreage outlook though, one key factor is the resiliency of prices after the 2021/22 highs. The strongest performer appears to be corn, while soybeans and peas seem to be holding their own. On the other hand, oats and flax seem to be the weakest.

Unfortunately, dry bean bids in Manitoba are a little scarce, but bids from south of the border show a similar pattern as the chart above. Prices already started to climb in 2020/21 with the sharpest rise in the summer of 2021 as the drought persisted. Prices remained at those highs

for months and only started to slide closer to the harvest of the 2022 crop. Even with this decline, dry bean bids have remained well above the market prior to the drought.

As mentioned, price is only one component in the decision process. Crop rotations need to be maintained, which limits the acreage shift between crops. How a particular crop has performed agronomically the last couple of years can affect decisions. Some farmers are contrarians and decide to plant a crop when most others are moving away from that crop. And, planting a range of crops helps diversify returns and minimize risk.

New-crop bids are only starting to become available and will have an even greater influence on decisions. But as we look at how the crop options stack up against each other, our best guess is that 2023 pea acreage in Manitoba will be close to unchanged, while seeded area could slip in other provinces. Meanwhile, dry bean plantings could be slightly higher in 2023 but will need to compete with soybeans, which are also performing well. ■

Our newest dicamba herbicides deliver higher concentrated formulations.

Roundup Xtend® 2 and XtendiMax® 2 herbicides with VaporGrip® Technology are higher concentrated formulations of the same herbicides you know and trust. They provide outstanding control of a wide range of weeds including Canada fleabane, common lamb's-quarters and kochia, as well as exceptional early-season short-term residual control for a clean crop during the crucial first stages.

DON'T COMPROMISE. PUT THE RIGHT SYSTEM TO WORK.

ROUNDUP READY 2 XTEND SOYBEANS
XTENDFLEX SOYBEANS
+
Roundup XTEND2 with VaporGrip Technology
OR
XTENDIMAX 2 with VaporGrip Technology
Roundup WeatherMAX HERBICIDE
=
ROUNDUP READY XTEND CROP SYSTEM

Learn more at **cropscience.bayer.ca/RUX2**

NEW CONCENTRATION

Roundup XTEND2 With VaporGrip Technology

XTENDIMAX 2 With VaporGrip Technology

Roundup Ready 2 YIELD TECHNOLOGY
LIBERTY LINK

Bayer is a member of Excellence Through Stewardship® (ETS). Bayer products are commercialized in accordance with ETS Product Launch Stewardship Guidance, and in compliance with Bayer's Policy for Commercialization of Biotechnology-Derived Plant Products in Commodity Crops. These products have been approved for import into key export markets with functioning regulatory systems. Any crop or material produced from these products can only be exported to, or used, processed or sold in countries where all necessary regulatory approvals have been granted. It is a violation of national and international law to move material containing biotech traits across boundaries into nations where import is not permitted. Growers should talk to their grain handler or product purchaser to confirm their buying position for these products. Excellence Through Stewardship® is a registered trademark of Excellence Through Stewardship.

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. It is a violation of federal law to use any pesticide product other than in accordance with its labeling. NOT ALL formulations of dicamba or glyphosate are approved for in-crop use with products with Roundup Ready 2 Xtend® soybeans. NOT ALL formulations of dicamba, glyphosate or glufosinate are approved for in-crop use with products with XtendFlex® Technology. ONLY USE FORMULATIONS THAT ARE SPECIFICALLY LABELED AND APPROVED FOR SUCH USES. Contact the Pest Management Regulatory Agency with any questions about the approval status of dicamba herbicide products for in-crop use with Roundup Ready 2 Xtend® soybeans or products with XtendFlex® Technology.

Products with XtendFlex® Technology contains genes that confer tolerance to glyphosate, glufosinate and dicamba. Roundup Ready 2 Xtend® soybeans contains genes that confer tolerance to glyphosate and dicamba. **Glyphosate** will kill crops that are not tolerant to glyphosate. **Dicamba** will kill crops that are not tolerant to dicamba. **Glufosinate** will kill crops that are not tolerant to glufosinate. Contact your Bayer retailer, refer to the Bayer Technology Use Guide, or call the technical support line at 1-888-283-6847 for recommended Roundup Ready® Xtend Crop System weed control programs.

Road to 2050: Grain Growers of Canada Paves the Way to Sustainably

Erin Gowirluk, Executive Director, Grain Growers of Canada

HAVE YOU HEARD the story of the poor, old farmer who lost his horse? All his neighbours came to him and said, "Well, that's too bad." The farmer said, "We'll see." The next day, the horse returned, bringing another horse with him. The neighbours proclaimed, "What good fortune!" to which the farmer replied, "We'll see." The next day, while taming the horse, the farmer's son fell and broke his back. Again, the neighbours came to the farmer and said, "Well, that's too bad," and again, the farmer replied, "We'll see." Shortly thereafter, a conscription officer came to collect all the able-bodied young men in the area but rejected the farmer's son due to his injury. Again, the neighbours came to the farmer and said, "What good fortune!" and again, the farmer said, "We'll see...."

Often, the narrative we create for ourselves shapes reality. If we follow the parable, we find that "good" outcomes depend on our outlook. It's very easy to define things as "good" or "bad," but what if, when we encounter a conflict, we embrace a "we'll see" approach before we predefine the outcome? Take Agriculture and Agri-Food Canada's (AAFC) fertilizer targets, for example. In 2020, AAFC announced its goal to reduce fertilizer emissions by 30 percent by 2030. The announcement and its subsequent rollout seemed uninformed and lacked the necessary details to ease farmers' concerns. On its face, it was a lousy outcome for all involved.

As farmers voiced their frustrations in the months following the announcement, Grain Growers of Canada (GGC) has also seen increased willingness on the part of the government to work together with farmers to develop sustainability solutions that support agriculture. In December 2022, GGC was pleased to be invited to join AAFC's Sustainable Agriculture Strategy advisor panel. The panel's creation marks what we hope to be a long-term strategic approach that leverages the work farmers are already doing. The panel also presents an opportunity. For decades, farmers across the country have led the way in innovation and sustainability. Farmers must be included in conversations about future developments. We cannot risk having an approach dictated to us. We also know we have a pivotal role to play, which is why GGC has not waited for government consultations. Instead, over the last year, we have worked with farmers, experts, academics, and industry partners to develop the Road to 2050, a practical and proactive set of recommendations to achieve Canada's net-zero goals.

Rather than having a negative outcome thrust upon us, we're paving a path to a more productive and sustainable future. Looking to 2050, experts expect food production will have to increase by 26 percent to keep pace with population growth. We already face extreme pressures with our food supply, so the simple truth is that sustainability and productivity must be linked; we cannot have one without the other.

Road to 2050, which will be released in late March 2023, is a framework for government that reflects the needs and goals of Canadian grain farmers. Farmers have long demonstrated they are part of the solution and that is why we are coming to the table ready to take on this challenge. We will advocate for farmers every step of the way. ■

View from the Field

Laura Schmidt, Production Specialist – West, MPSG

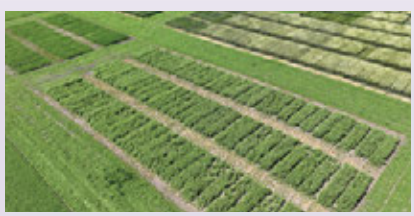
EYE IN THE SKY

It's undeniable that drones are fun. I still have to stop myself from making airplane noises when taking off. But how useful are drones as a tool in an agronomist's toolkit?

As MPSG's On-Farm Network program sought to evaluate the utility of having a drone for observing treatment differences from above and was exploring multi-spectral camera, I set out to see what other value we could get out of having an eye in the sky.

As a tool for extension, drones are essentially cameras that can get better angles of what you're trying to show. I can show the devastation Aphanomyces can have on a pea crop, take a single snapshot of all of the plots in a small-plot trial and chase equipment through the field.

As a tool for scouting, it's come in handy. Having a view from above (right) helps identify which areas of the field need more investigation. It's useful to assess on a whole-field basis if there are any patterns in the field or if the majority of the field has reached certain stages (like flowering or maturity). It makes us more efficient with our time in the field to target problem areas. At the end of the day though, nothing replaces boots on the ground or a shovel in the soil to truly know what's going on in your field.



In-Field Photography Tips for Agronomists and Farmers

Toban Dyck, with files from Canola Watch

PHOTOGRAPHY. Many of us dabble in it. Agronomists use it as a tool to reach farmers, correspond with fellow scientists and for research. And farmers enjoy photography for the same reasons, as well as for capturing sunsets/sunrises while out on the field. The craft is to be appreciated for its technological complexities. Its technological possibilities. And, of course, its entertainment value.

Below are a few guidelines for honing your approach to photography ahead of the 2023 growing season.

1. **When photographing a plant with known or unknown disease and/or pest pressures, keep an open mind.** Don't have a preconceived notion of what the problem is, and try not to convince the agronomist or other diagnostician what you think the problem is before everyone has had a chance to assess the facts. One symptom can have many causes, and an issue confined to a few plants in a corner of the field may not be worth the management effort.
2. **Focus on focus.** Take a look at the photo on a large screen before you send it. Zoom in. Is it sharp? All cameras are challenged to take sharp close ups, especially when the subject is small and the lens is 2 inches away. Choose the camera's "macro" setting if you have that option. It is better to back away from the insect or lesion or weed a few more inches to achieve good focus. The subject may be smaller in the view finder, but if the focus is better, the agronomist/diagnostician receiving the photo can zoom in for a better look.
3. **Cover the angles.** Top. Side. Front. Back. Close up. Mid-range. And Long range – if an overall field shot seems useful, as it could be with spray efficacy or seeding issues. If shooting leaf damage, photograph the topside and underside of leaves. For weeds in particular, take pictures of as many parts of the plant as possible – roots including any perennial parts, flowers, inside the flowers, outside the flower and not just the coloured showy bits, a leaf by itself and attached to the plant, where the leaf attaches to the plant, the stem, close up of hairs, and with grasses pull back the leaf away from the stem and take a shot of the collar region so that ligules and auricles are visible.
4. **Use a size reference.** Include a ruler, coin or pen in the image so the viewer has a clear idea of the subject's size.
5. **Seek contrast.** If possible, and if the plant has been uprooted for the photo shoot and further assessment, set it against a surface that allows its details to pop – a green plant atop a white piece of foamcore or a piece of paper.
6. **Get creative.** There are a lot of plant photos out there. Try capturing the plant in a way that you haven't seen done before. This may help tease out and bring into focus elements of the plant that you hadn't previously captured.
7. **It's all about light.** Shoot with the sun behind you. If you don't do this, your plant will be a black silhouette


Photo Credit – Toban Dyck

against an overexposed sky. If it's midday and there's no avoiding the sun, use the flash on your phone or DSLR camera. This will help. Also, watch out for shadows. Be mindful of them and make sure your subject, be it a plant or person, is not darkened by a shadow. Adjust your stance/location, accordingly.

8. **It's also about the details.** Remember where you took the photo – land number, where on the field you were standing and any other details that could help the famer, agronomist or diagnostician properly contextualize the problem/photo.
9. **Prepare, prepare, prepare.** If you're planning on spending the day taking photos, make sure you have enough space on your phone, some extra SD cards and that the batteries on your DSLR and phone have been charged. This is important. There is nothing worse than being out in the field, ready to snap, and then realizing you don't have what you need. Try to carry a camera and extras of all related things in your summer vehicle. Then, even if you hadn't planned to take photos that day, you are ready.
10. **Settings are an internet search away.** Your phone will produce a good photo in most circumstances, but that isn't always the case. For example, it will not tell you if your plant is in a shadow or if it'll come out a dark silhouette. If you're out and about with a DSLR, assess the day's weather and search the internet for the appropriate settings, keying in the device you'll be using, whether you're shooting outdoors or indoors, and what it is you'll be photographing. Include any additional details that may make your photoshoot unique – wind (moving plants), rain, etc.
11. **The photo itself is merely the first step.** Once you've taken your photos and recorded the details, it's time for processing. Photo-editing software is not a requirement, but some level of processing is. Pull all of the relevant photos off of your phone (uploading to a shared drive, such as Google Photos, is a great way to make this process seamless), delete the blurry ones and then group the good ones into labelled folder that can easily be found later on. Few thing are more frustrating than an archive of digital photos that don't have labels and haven't been culled.
12. **Have fun.** ■

Thinking about Emission Reduction Targets? Pulses Pack an Environmental Punch

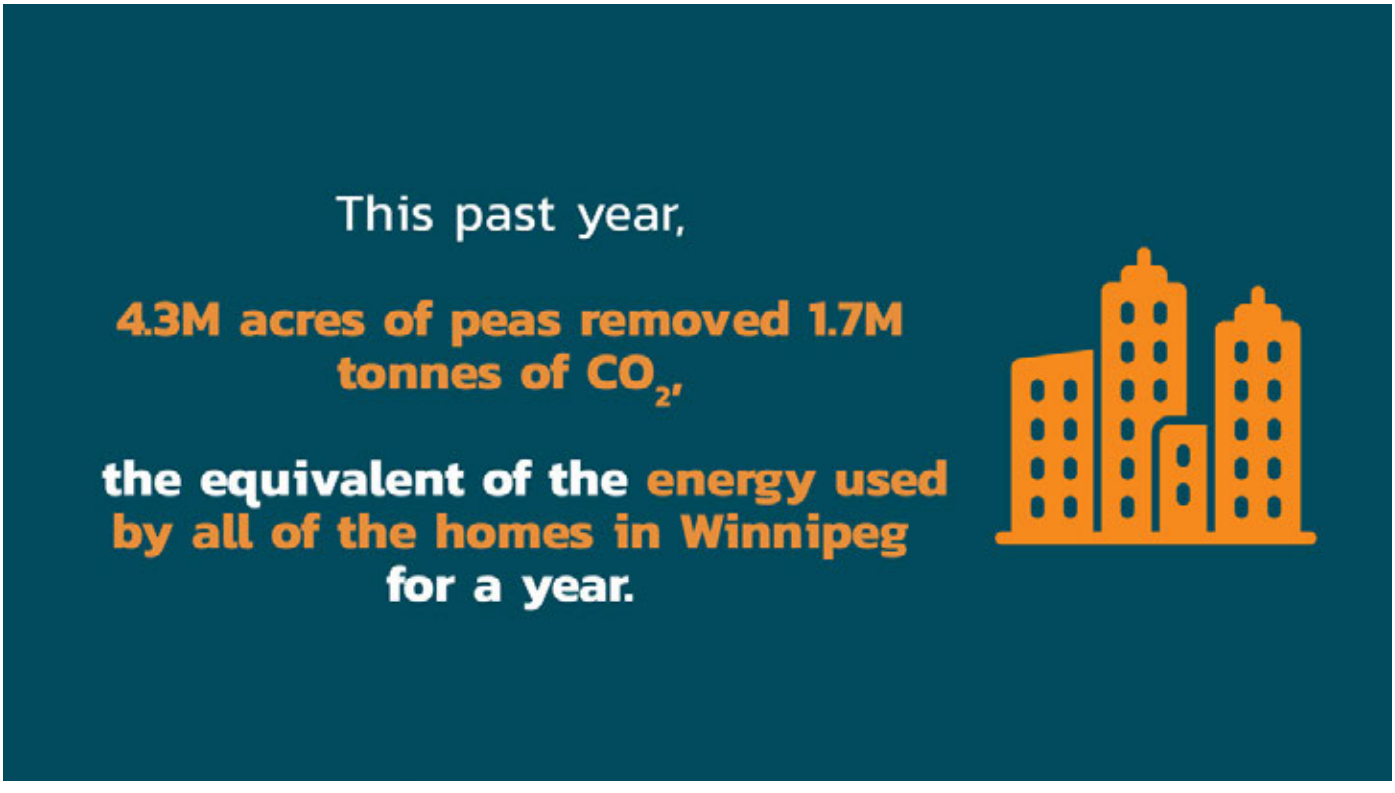
Denis Tremorin, Director of Sustainability, Pulse Canada

THE BENEFITS OF pulses in crop rotations are well known from an agronomic perspective, in particular the nitrogen-fixation abilities of pulses that reduce the nitrogen fertilizer needs of Canadian farmers. The unique capacity of pulses to fix their own nitrogen from the air provides a major greenhouse gas benefit, and has been well documented in Canadian research studies. Additionally, with huge contributions to Canada's GDP and economic output and with providing full-time work to almost 26,000 Canadians, the economic benefits of pulse production cannot be ignored.

Within the context of the corporate and governmental focus on greenhouse gas emissions, pulses provide a major benefit by reducing greenhouse gas emissions from Canadian agriculture. This is particularly relevant with the federal government target of reducing nitrogen fertilizer emissions by 30 percent by 2030. As farmers know, Canadian pulse production is already contributing to limiting emissions from nitrogen fertilizer.

The key question is, how much do Canadian pulses contribute to reducing greenhouse gas emissions – both on the farm and nationally? Research commissioned by Pulse Canada shows that Canadian pulses are some of the most sustainable crops in the world, as disclosed in the *2021 Canadian Pulse Industry Environmental and Economic Impact Report*. The report focuses on the greenhouse gas impacts of pulse production in crop rotations and as individual crops in the rotation. These impacts are distinguished by pulse type (peas, lentils, dry beans, chickpeas, and faba beans) and by province. The greenhouse gas impacts of total production in Canada are also calculated, which provides an estimate of the national impact of the Canadian pulse industry to reduce emissions in a substantial way. The 2021 Canadian pulse crop reduced greenhouse gas emissions by up to 3.6 million tonnes of CO_2 equivalents, which represents a reduction of emissions that accounts for more than a quarter of the direct and indirect emissions associated with applying nitrogen fertilizer, which was 12.75 million tonnes of CO_2 equivalents in 2019.

In addition to reducing greenhouse gas emissions, pulses are a protein source with a very low water footprint. Pulses such as peas, lentils, and chickpeas are well-adapted to semi-arid conditions and can tolerate drought stress. Pulse crops like peas and lentils also use water in a different way than other crops grown in rotation. They extract water from a shallower depth,



leaving more water deep in the soil for the following year's cereal or oilseed crop.

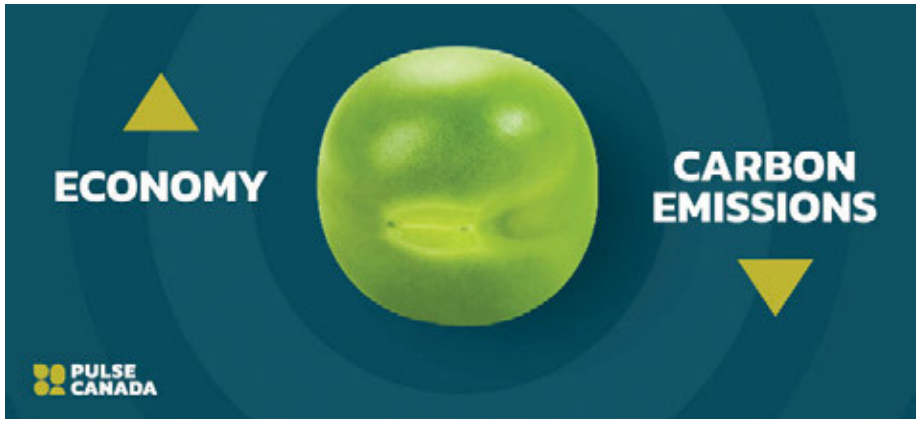
Including peas, lentils, or beans in crop rotations also has sustainability benefits for the crops grown after. Crops like wheat and barley produce higher yields and have higher protein when grown after pulses. This is due to the soil fertility, water, and soil microbial benefits of pulse crops.

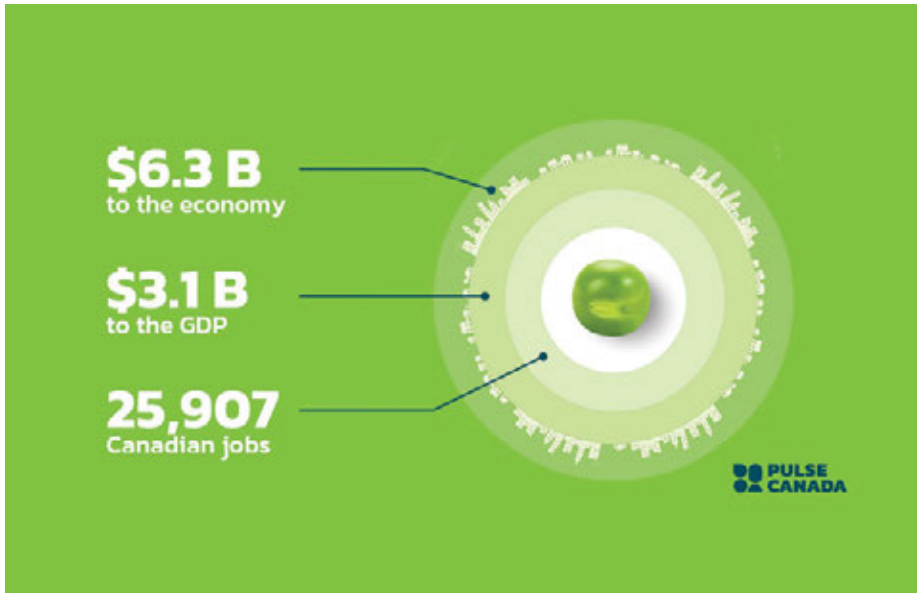
Incorporating pulses in livestock diets also reduces the environmental footprint of pork and egg production. A recent life cycle analysis commissioned by Pulse Canada found incorporating peas into pork rations reduced the carbon impact of the feed by 28 percent, and the overall emissions of the pork by 18 percent.

Under a responsible growth scenario, as part of an economically viable rotation along with cereals and canola, pulse acreage could increase between 14.2 percent and 40.3 percent by 2030. This means Canadian pulses could remove a further 1.4 million tonnes of CO_2 equivalents from our environment by 2030.

While pulses pack an environmental punch, they are also an economic performer. The economic contribution of the Canadian pulse industry is also highlighted in the report. Over 26,000 pulse producers contribute to a pulse industry that generates an estimated $6.3 billion in economic output and $3.1 billion to the GDP of Canada.

In February 2023, Pulse Canada launched the *Environmental and Economic Impact Report* as part of its Impactful campaign. Through this campaign, Pulse Canada is positioning pulses in agronomically responsible rotations as one of the key environmental pillars of the Canadian agricultural system. Practices such as no-till, 4R Nutrient Stewardship, and integrated pest management practices are rightfully seen as agronomically responsible and environmentally beneficial, and this study shows that pulses in Canadian crop rotations should be included in this list. Pulse Canada and our members are using the report to help prioritize programs and issues for the Canadian pulse industry that require government attention and investment.





To date, government investments to help the sector seize sustainability opportunities have been provided through Sustainable Canadian Agricultural Partnership (Sustainable CAP) and Agriculture Climate Solutions via the On-Farm Climate Action Fund and Living Labs programs. The industry will continue to rely on the support of Sustainable CAP programming, such as the AgriMarketing, Science Clusters, and AgriAssurance programs to ensure work is being done to grow exports while lowering emissions.

The key takeaway is that federal and provincial governments should view any dollar invested in Canada's pulse sector as a dollar invested in reducing Canada's emissions. Growth in Canada's pulse industry means lower carbon emissions and higher economic output, making Canada's pulse industry a "green" investment.

For more information and to download a report summary, visit pulsecanada.com/impactful ■

A Change of Winds in Spray Technology

Tom Wolfe, Spray Application Specialist, Agrimetrix

The unsprayed quarter lay before Sam and Jo, the rain bearing down. If only they had found the time to apply herbicide before the Colorado Low lay waste to their plans. Now it would be a week before they could put a wheel on the land. The weeds will have taken their pound of flesh by then.

OF ALL AG EQUIPMENT, the sprayer has emerged as the most-used piece on the prairie farm. It runs nearly every week of the growing season, starting with pre-seed burnoff, continuing through insecticide, herbicide, and fungicide applications, perhaps some nutrient topdressing, and ending with pre-harvest weed control, and increasingly, desiccation and late fall residuals. The average farmer covers each field four to five times per season with the sprayer.

With the growing importance of the sprayer, an interesting new issue has come into focus. In the past five years, we've moved away from obsessing about nozzle technology and instead are taking on the task of improving time management. Why time management? Because with greater workloads and more constraints regarding when we can spray, we need to make better use of every spray hour available. Remember, good agronomy is doing the right thing at the right time – that includes spraying at the right time.

The basis for better time management is analyses of how sprayers use their engine hours. It turns out that for an average user, about one third of engine hours are idle time. Another quarter or so is spent transporting. And less than half (sometimes as little as a third) of the time is spent actually spraying.

That begs the question: How is idle time spent? And the follow-up: If idle time is reduced, how will it impact sprayer productivity?

Dozens of important tasks happen on a spray day while the sprayer is idling. These range from routine servicing to fuelling to entering data in the monitor. But the biggest time hogs on a spray day are filling and cleaning. And that's where we find the most interesting innovations in spraying.

The best thing someone can do to improve their spray operation is to conduct an audit of their time use and invest in better tendering and cleaning procedures. Reducing fill time from 30 minutes to 10 or even five minutes can add 30 to 50 acres per engine hour (Figure 1). This is especially true in pulse crops where higher water volumes for herbicides, fungicides, and desiccants are common. Improving cleaning efficiency can add another 10 to 20 acres per hour. You can't get those kinds of improvements with a new sprayer purchase.

The value of increased productivity is two-fold. We obviously need to cover ground efficiently with bad weather approaching. But we also recognize that simply driving faster has many negatives – more dust, more fuel consumption, more wear and tear on equipment, more drift, and lower spray deposit uniformity. If we can get more done and do a better job, it's a win-win.

Let's take a closer look at the tendering system. At the heart of it is a three-inch plumbing system mated to an efficient pump that can deliver about 400 gallons per minute. That will fill an average sprayer tank in three to four minutes. Of course you need to allow for a throttle-back to induct the product, but the whole process can be completed in seven minutes or so. Don't forget to include the time to reach the tender truck, or to swing the heavy three-inch hose over; it makes sense to minimize that too.

And don't forget about filling the tender itself. A 5000-gallon tank requires more

Figure 1. A well designed tender system, like this one from PhiBer in Crystal City, can add many acres per day to a spray operation.

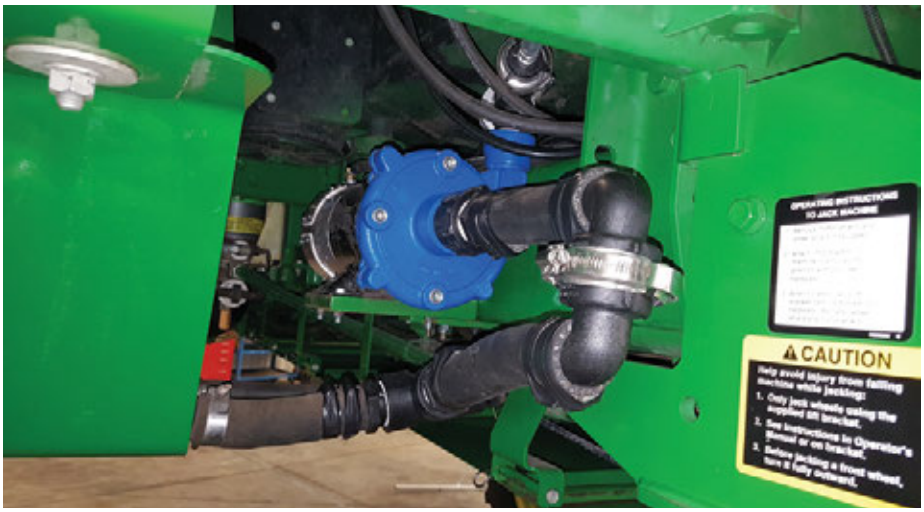


Figure 2. An electric pump dedicated to the clean water tank helps with rinsing the sprayer plumbing.

Figure 3. Recirculating booms, like this on Pattison Liquid's Sniper sprayer, make cleaning easier and priming less wasteful.

than one hour of pumping time through three-inch plumbing. Upgrading to a faster fill rate for that operation alone can add significant capacity to a busy day. I've visited farms with five-inch electric pumps that deliver 1000 gallons per minute. Or others that install bulk water tanks at a remote location for faster access.

Cleaning is another time thief. As pulse crops can be very sensitive to many of our cereal herbicides, it's important to ensure complete removal of residues from the spray tank and plumbing. As a result, we often add rinses as insurance. A thorough cleaning can take 90 minutes, often because there are no real indicators when the task is done (we might find out in a week or two, though).

Cleaning can be improved with some simple plumbing changes. My favourite is the continuous rinsing system we learned about from some German colleagues. It involves the installation of a second pump – one dedicated to the clean water tank (Figure 2). It works as follows: An operator finishes a field and sprays out any remainder. When the tank is empty and the pressure gauge becomes erratic, she simply turns on that second pump to introduce clean water to the tank via the washdown nozzles. Carefully watching the pressure gauge to keep the sump volume low, she continues to spray out the tank as the water rapidly dilutes the spray mix. When the clean water tank is empty, the plumbing will contain mostly water. And the elapsed time will be five minutes. She still needs to look after screens and boom ends, but the most time consuming part is done.

Boom ends are another problem area. Clearing them of residue involves opening both ends on each section and allowing the material to spill on the ground – a messy operation. When the next spray mix is added, boom ends should be cleared of air or water to prime the boom. A recirculating boom takes care of both issues (Figure 3). To create such a system, the individual sections are strung together to form a continuous line on each wing. Spray mix is fed to the end of each boom wing and centre section, and it runs along the entire boom back to the tank where there is a shutoff valve. When this valve is open, the spray tank contents simply recirculate through the boom and back to the tank. When the valve is closed, normal spraying occurs. Sectional control is achieved through individual nozzle shutoffs, either solenoids via PWM, or air-activated for less cost.

Recirculating booms avoid residue build up in boom ends. They also allow the boom to be primed without spraying anything on the ground, minimizing waste. The feature is standard on European sprayers and is being added to many North American brands. Retrofit kits are also available.

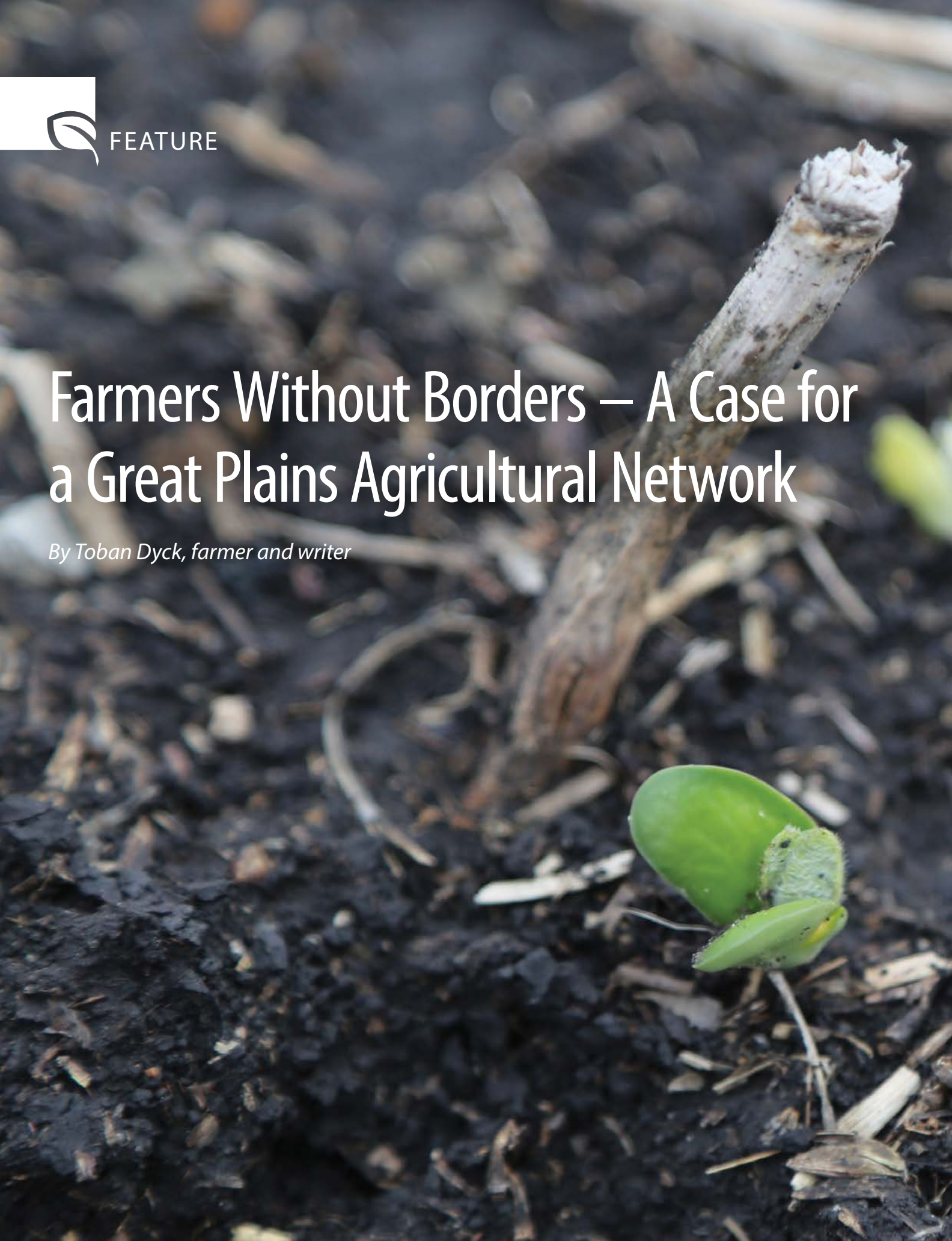
A clever invention that I have come to appreciate is the Accu-Volume System tank level indicator. It's a load cell plumbed into the tank sump that measures the weight of the liquid and reports the tank remainder to the closest gallon at any slope position. It's more accurate than the level reporting from traditional floats or sight gauges, particularly when that level is low. Knowing the exact volume of the tank is powerful – it allows continuous rinsing, for example, to work optimally by informing the operator if the clean water flow into the tank matches the spray outflow so that water accumulation in the sump can be prevented. It also eliminates the uncertainty of filling the last tank, making sure there's enough without creating waste. That knowledge saves stress and time.

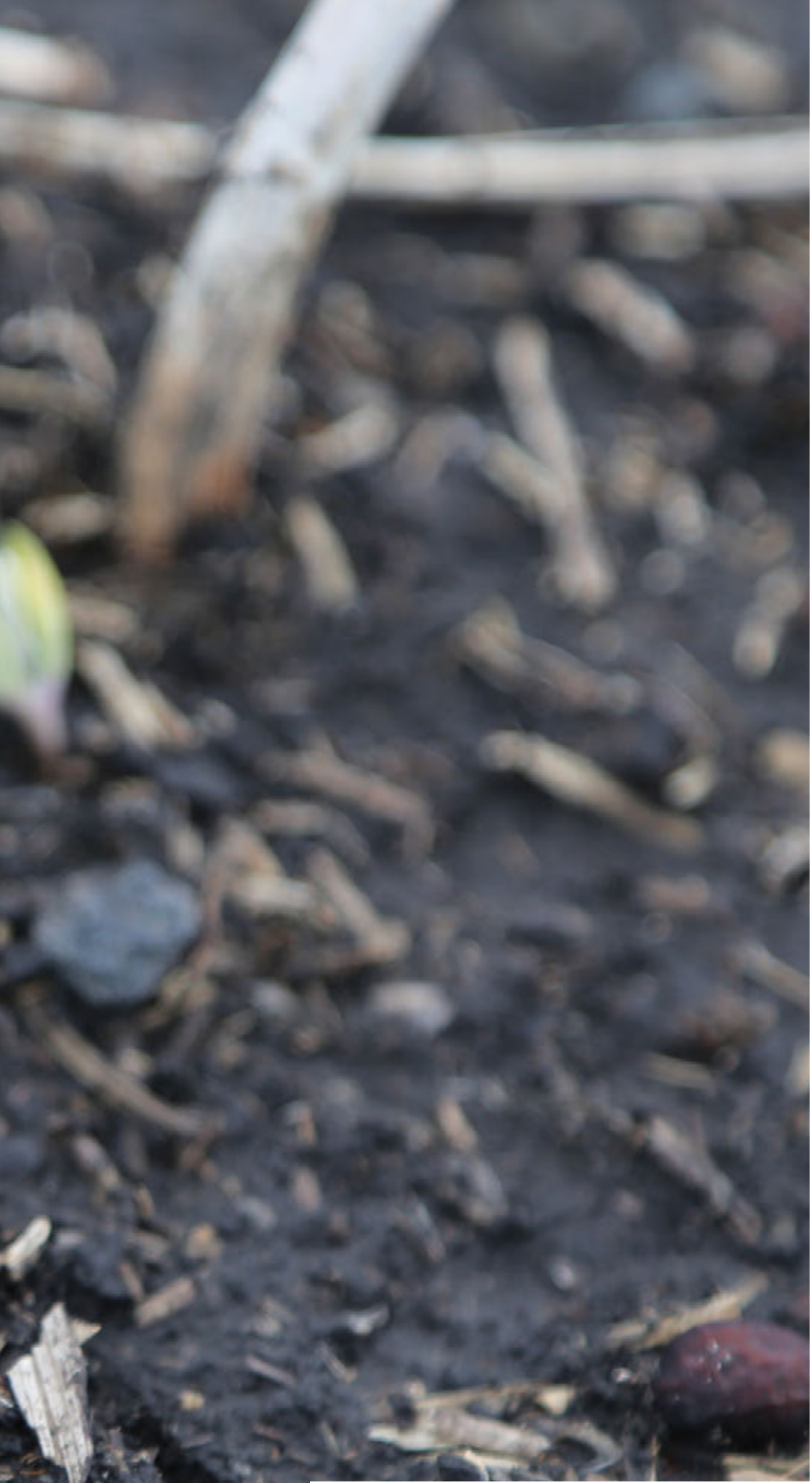
It's been interesting to watch and nurture this change of winds in spraying. Ten years ago, most of my inquiries were about selecting the right nozzle. Today, I field many calls on how to improve spray efficiency. With sprayers costing a sobering amount of money, it's well worth looking at getting the most from what you already have before opening the wallet. Having completed all your scheduled spraying, a confident calm can descend on you as you watch the rain approach. ■

FEATURE

Farmers Without Borders – A Case for a Great Plains Agricultural Network

By Toban Dyck, farmer and writer





Plants bursting through residue-rich soil

Photo Credit – Toban Dyck

CANADA, LIKE ANY other country, has borders. We talk about these borders as if they're real in the same way stubbing your toe on a chair is real, but they are not. Canada doesn't exist to a soybean plant, and it certainly, and sadly, doesn't exist to plant disease. Weeds don't stop at the border. They don't wait in line at the border. And border officials are not equipped nor mandated to refuse them entry.

It's only natural for organizations like Manitoba Pulse & Soybean Growers to connect with its sister groups across Canada – Saskatchewan Pulse Growers, Alberta Pulse Growers, Ontario Bean Growers. These research-focused groups are friends, as well as a support network. They can offer a deeper level of service to the farmers they represent because of their cross-Canada connections.

There is, however, another framework through which the agricultural industry could redraw its boundaries. We could create new networks that may, in the end, do a better job of accounting for regional growing conditions, different soil types, various climate zones, and area-specific disease pressures.

We are strongly tied to the provinces to the east and west of us, but a significant area of Manitoba south of forests and west of the Canadian Shield is also a part of the Great Plains, which is a huge swath of land home to many farms situated between the Rocky Mountains and the Missouri and Mississippi rivers. Those who live and work in this area share too much to ignore. In fact, there's a case to be made for Manitoba farmers developing closer relationships with our neighbours to the south, with whom we share an awful lot. Agronomically, we have a lot in common, and when they flood, our Red and Souris rivers do, as well. We are tied to them in a myriad of ways.

"I think so many of our producers face similar challenges," says Stephanie Sinner, executive director of the North Dakota Soybean Council based in Fargo, a city that has been revitalized over the past 10 years and one she knows quite well.

Sinner's optimism towards developing a closer relationship with MPSG is evident. She and her husband, who is also involved in the soy industry, travel to Winnipeg often. "It takes the same amount of time

continued on page 22

A drone shot of the Great Plains in Southern Manitoba

Photo Credit – Toban Dyck

continued from page 21

for us to drive to Winnipeg as it does for us to go to Minneapolis. We like Winnipeg."

Her organization, which publishes the magazine *The North Dakota Soybean Grower*, met with MPSG prior to the pandemic to start the process of building stronger ties between their two like-minded organizations. Sinner is enthusiastic about picking up where things left off.

"In North Dakota, and I think it's similar in parts of Manitoba, we have farmers in the northwest and southwest corners of the state who are adding soybeans to their farm rotation for the first time," says Sinner. "And that's unique among our U.S. colleagues and peers where soybeans are well established. We're seeing that soybeans are a profitable option for farmers in North Dakota, and it's very exciting to have check-off funded research available to help them work soybeans into their rotation. The global demand for soybean is huge. It's an opportunity both Manitoba and North Dakota producers are pursuing."

As Manitoba's farmers become more comfortable embracing soybeans in their rotations, disease and pest pressure will grow. This is something Sinner and her council are aware of. She knows what they are experiencing will eventually make its way to Manitoba. There's an inevitability built into that south-north model that doesn't exist in the same way when we view agriculture in Canada through the east-west lens.

"Noxious weeds like Palmer amaranth and kochia don't recognize a national border, so sharing information and resources across those lines is beneficial," says Sinner. "We're just trying to stay ahead of some of those pressures by learning from our fellow producers and producer groups in the southern Midwest states. Iowa, Nebraska, and Kansas have been through this and learned from it. We can learn from them and be aware and proactive so that our farmers can continue to grow good quality crops."

The North Dakota Soybean Council does a lot of work on soybean cyst nematode (SCN) and they focus a lot of their attention towards awareness campaigns – equipping farmers with the tools needed to identify and stay ahead of production losses associated with, say, white mould, Palmer amaranth, kochia, waterhemp, and other challenges that arise, depending on moisture levels heading into and during the growing season.

"Insect pressure, disease pressure, and weed pressure are all growing as we get more and more soybean acres in our region," says Sinner. "We can become more and more susceptible to all of these things as soybean producers, and these things don't know the border. Our diseases, weeds, and pests will become issues that Manitoba producers face too. Any time we can leverage information and resources to help our farmers, that is always a really good thing."

Dwayne Beck agrees.

On paper, Dwayne Beck, Ph.D, is retired, but in practice he's anything but. Beck is a professor in the plant science department at South Dakota State University and the former research manager at the Dakota Lakes Research Farm in Pierre, South Dakota.

If you've been involved in the no-till movement, you'll likely know who he is. If

Photo Credit – Toban Dyck

Assessment of soybean roots at a Manitoba Pulse & Soybean Growers field day

you've ever researched biodiversity, you'll likely know who he is.

Beck was preparing supper when we spoke. The clamour of pots and pans could be heard in the background. "I'm cooking cod – not that great walleye you have up there in Manitoba."

He and his wife live in South Dakota, but he knows Manitoba better than most, and I mean that. The second I heard his voice, it was clear that this is a person who, A) likes to chat with interested people, B) knows an awful lot about agriculture, and C) is full of zingers.

When asked how he'd like to be referenced in this article, he said, and I quote, "You may call me anything, but don't call me late for supper." In case I hadn't heard that from my dad, he felt compelled to tell me it was an "old farmer saying."

Beck believes there's value in this regional approach to agronomy, and by regional, he uses words such as "parkland," "lacustrine," "tallgrass prairie," and more. These are ecosystems, soil types, geographical areas. This is Beck's world and his wheelhouse.

"There are a lot of commonalities across the Great Plains," says Beck. "One of them is crop rotation, or lack thereof, and I think the other one is the need to increase the amount of residue that we have. After growing a pulse or soybean crop, there's nothing left."

Beck recalls attending an agronomy-related conference in Winnipeg in 2014 and chatting with someone about a discussion they had years ago.

"You told us we could grow corn in the Red River Valley, and we didn't think we could," Beck recalls his colleague as saying.

"Well, now there's a lot of corn there," says Beck, adding that soybeans are going through a similar process of disbelief to belief.

Beck points out that the American corn belt, which spans many states in the Midwest, deals with a lot of the same problems as we do in Manitoba due to short rotations. "I think observing agricultural practices in regions similar to your own is a good idea," says Beck.

NORTH DAKOTA SOYBEAN BOOM

North Dakota is in the throes of a soybean boom, according to Sinner. The number of acres dedicated to soybeans is growing. Farmers are becoming more confident in the crop and the state is about to be home to three crush plants, two of which are currently under construction and almost operational and a third slated to break ground soon.

Driving this market surge and this, as Sinner put it, "180-degree change in the North Dakota soybean market" is the U.S.'s skyrocketing demand for renewable biodiesel, the primary feedstock of which is soybean oil.

According to the January WASDE, the USDA expects 11.6 billion pounds of soybean oil to go to biofuel production for 2022-23, a number representing a year-over-year increase since at least 2020.

"The products we're now marketing and moving out of state is really exciting," says Sinner. "Years of check-off investments have helped get us to this point, where biodiesel and renewable diesel are in demand like they now are. We see similar things happening in Canada with canola being able to respond and participate in that biofuel space. Hopefully, soybeans can remain and stay a big piece of that feedstock because I think it's just it makes complete sense for the end fuel user as well as for the producers who are growing soybeans."

LONG-TERM FARMER INVESTMENT PAYS OFF

This surging demand for soybean is, according to Sinner, the result of about 30 years of hard work – growing demand for biofuels, ensuring diesel blends meet specifications and can work in a myriad of engines, working with engine manufacturers, and helping operators understand that these fuels are better for their machines and the equipment. Farmer investment dollars also went towards working with communities looking for options to help improve air quality.

With the excitement surrounding soybeans happening within arm's reach of Manitoba's farmers, and with the commonalities the province's growers share with vast areas of the Great Plains, there's a case to be made for paying more attention to what North Dakota is up to. Diseases don't recognize a national border. Perhaps we'd make better agronomic decisions if we didn't either. ■

Industry-Driven Innovations – A Bright Light for Agriculture in Manitoba

Toban Dyck, farmer and writer

MANITOBA'S FARMERS SHOULD be paying attention to Protein Industries Canada. Founded in 2018, Protein Industries Canada has already become the crucible in which ideas, research, and business have come together to put Canada on the global protein map.

In the 2023 winter edition of *Pulse Beat*, we highlighted the work Hailey Jefferies, owner of Prairie Fava and former Manitoba Pulse & Soybean Growers (MPSG) board member, has been doing in partnership with PIC. Private and public dollars came together to create a new market for fava beans. The collaboration between a farmer, two businesses, and Protein Industries Canada is a success story in how industry-supported innovation can tangibly impact Manitoba's agriculture industry, create and strengthen markets for farmers and, in the end, increase profits.

"Over the past five years, we saw several highly successful pulse projects across Manitoba and Canada, and we look forward to the next five years of continued innovation across the value chain as we work to establish Canada as a global leader in plant-based foods and ingredients," says Bill Greuel, CEO of Protein Industries Canada. "Upcoming projects will have an emphasis on ingredient processing, and by supporting the scale-up of companies and the commercialization of new products, we believe we are well on our way to have a $25 billion plant-based food and ingredient industry in Canada by 2035. Through this robust plant-based foods sector, producers, consumers and Canadians alike will experience the economic benefits of this innovation, and a more sustainable and green Canada."

This and other initiatives are part of Protein Industry Canada's ambitious plan to elevate Canada's plant-based food, feed, and ingredient sales from about $3 billion, annually, to $25 billion by 2035 – The Road to $25 Billion.

Pete Giesbrecht, owner of Pulse Genetics, a pea breeding company based in Manitoba, has been working with Protein Industries Canada to develop pea varieties that have high enough protein levels to serve as a meat substitute and starch profiles that make the plant better for extrusions.

"We're part-way down the breeding road," says Giesbrecht, referring to the completion of phase one of the project. "We've had some success, but in a year and a half, there is not enough time to bring a new variety into being."

Giesbrecht, who grew Pulse Genetics from a hobby garden to an active breeding outfit, is looking ahead and is committed to carrying on with this project – a new yellow pea variety that would be available to Manitoba's farmers, allowing them to participate in high-value pulse markets.

"The focus for me at Pulse Genetics is the different aspects of protein and protein composition," says Giesbrecht. "But, a big concern right now is root rots, so I'm looking at expanding into that area of breeding, as well."

In addition to breeding programs like Giesbrecht's, industry-led innovation in agriculture also encompasses new technologies, such as artificial intelligence. Until March 31, 2026, Protein Industries Canada has committed to investing $30 million into artificial intelligence projects that benefit the plant-based and agri-food sector.

Chris Bunio is the co-founder of TheoryMesh, a Manitoba-based digital platform focused on tracking data and providing traceability in the agri-food supply chain.

"What we want to get to is more forward-looking, predictive capability, particularly being able to look at all the different variables on crop and food nutrition," said Bunio, in a news release. "One of the theories that I have, and other people maybe have, is that farm practice, farm soil type, and farm applications all affect crop nutrition, and that crop nutrition affects how crops can be turned into protein products and other food products."

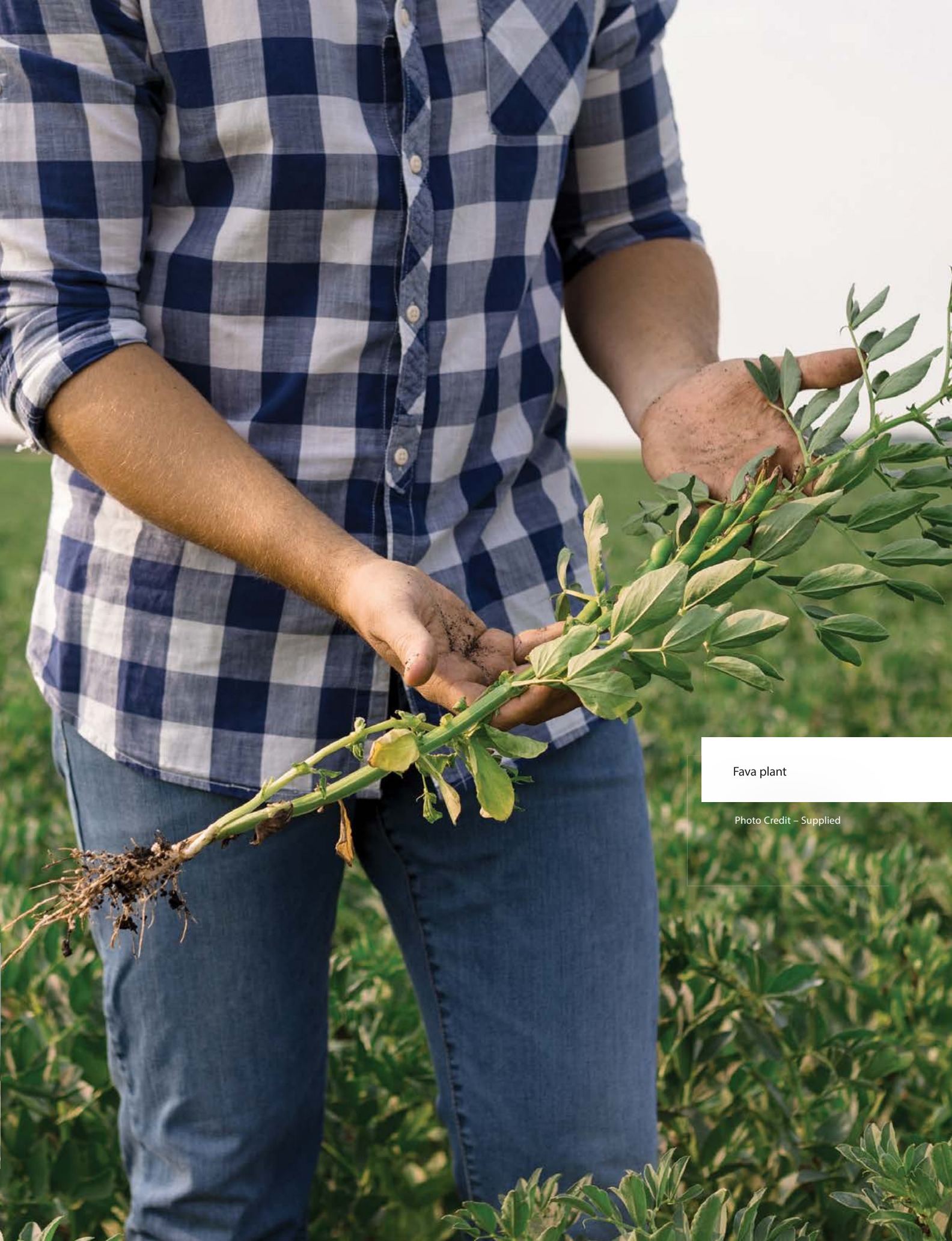
Industry-supported innovation is key to a thriving ag industry. Manitoba's farmers and business owners are discovering ways to diversify their operations, whether through processing or the adoption of new technologies and processes. Stories like these are testament to how organizations can work together with farmers and other agricultural innovators to enhance ideas, increase funding, and take things from concept to market. ■

Photo Credit – Supplied

Prairie Fava CEO Hailey Jefferies with a handful of fava beans

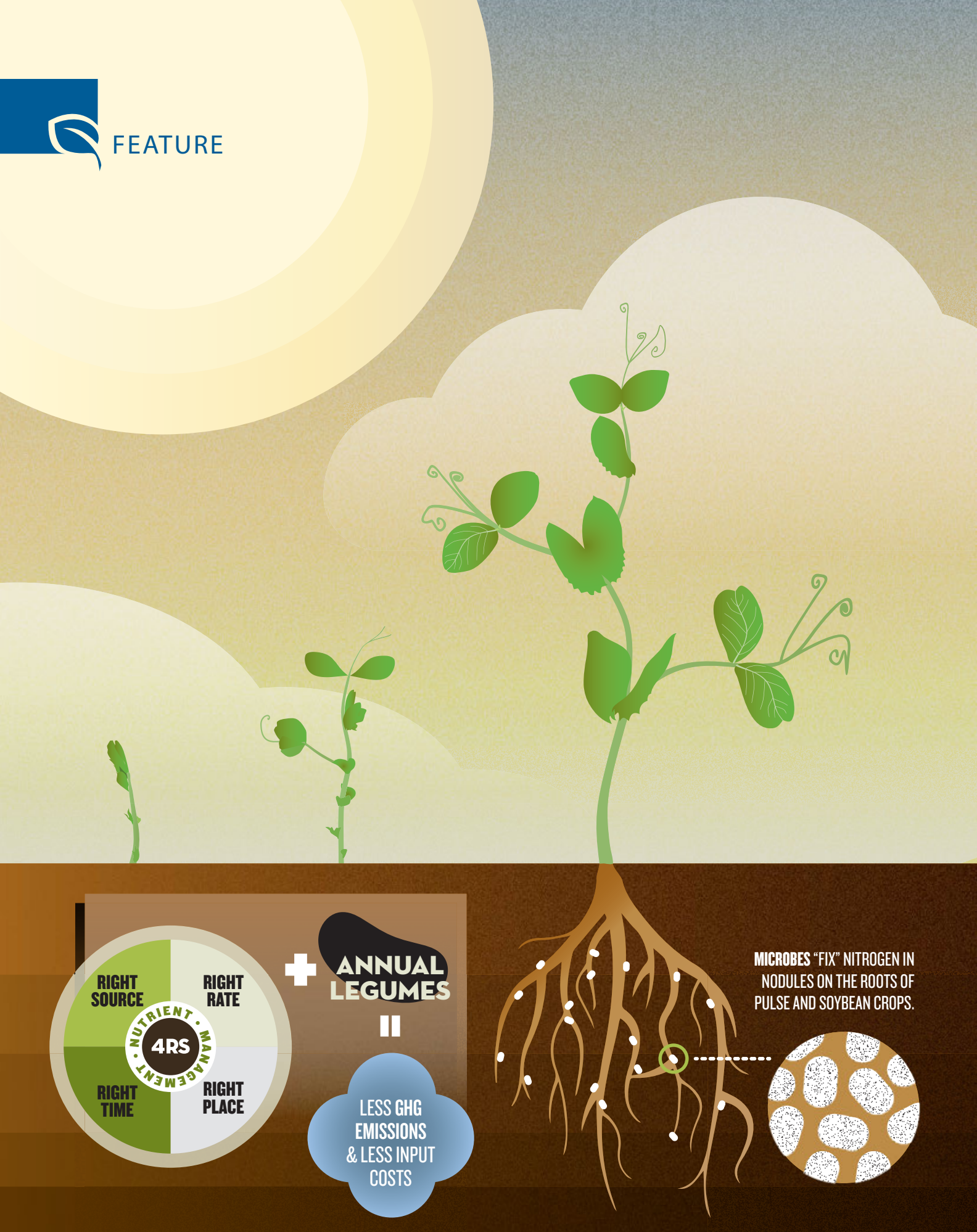
Roquette Portage

Photo Credit – Supplied



Fava plant

Photo Credit – Supplied


RIGHT SOURCE
RIGHT RATE
4RS
NUTRIENT · MANAGEMENT
RIGHT TIME
RIGHT PLACE
ANNUAL LEGUMES
LESS GHG EMISSIONS & LESS INPUT COSTS
MICROBES "FIX" NITROGEN IN NODULES ON THE ROOTS OF PULSE AND SOYBEAN CROPS.

Role of Annual Legumes in the Low-Carbon Economy

Charley Sprenger, B.E., M.Sc., Project Leader
Gary Bergen, P.Eng., Technical Lead | The Prairie Agricultural Machinery Institute (PAMI)

Annual legumes play a critical role in today's low-carbon economy. The following two articles illustrate how introducing legumes into your crop rotation could mean lower input costs, greater environmental benefits, and increased profits.

Key Takeaways

- Legumes have low greenhouse gas (GHG) emissions, especially nitrous oxide.
- This is because little to no nitrogen (N) fertilizer is required to produce legume crops (a large amount of GHG emissions is produced through the production, delivery, application of nitrogen fertilizers).
- GHG calculations take into account background emissions from the field in the form of nitrous oxide.
- Kristen MacMillan's research at U of M indicates dry bean are better at sourcing their own N than previously thought.
- In PAMI's analysis 60 – 70 lbs N / acre was used but if dry bean can source N on its own more effectively than we thought, then N might not need to be applied or maybe just at a lower rate... and then its GHG emissions will be lower.

THE GOAL OF this project was to provide information on the energy (fuel) use and greenhouse gas emissions generated from current management practices used for soybean, field pea, and dry bean production in Manitoba. This information was then used to assess potential changes farmers can implement to further reduce greenhouse gas emissions, and to determine areas that require further research and investment for the agricultural industry to increase energy use efficiency and carbon sequestration.

The sources used to estimate the energy use and greenhouse gas emission baselines for each crop included the Guide to Field Crop Production and Cost of Production – Farm Machinery (Manitoba Agriculture), PAMI machinery analyses, extension publications, and scientific literature.

The on-and off-farm energy use and greenhouse gas emissions from the following sources were included:

- Production, delivery, and application of nutrient sources
- Decomposition of crop residues
- Nitrogen credits
- Machinery use for seedbed preparation and seeding, application of crop protection products, harvesting, residue management, and grain handling

continued on page 28

continued from page 27

Table 1. The range of estimated energy (fuel) use and greenhouse gas emissions for soybean, field pea, and dry bean.

Crop	Energy Use (Litres acre-1)	Greenhouse Gas Emissions (CO_2e acre-1)
Soybean	11 to 18	-5 to 38
Field Pea	14 to 24	-10 to 15
Dry Bean	13 to 18	132 to 190

The estimated range of energy use and greenhouse gas emissions for soybean, field pea, and dry bean are presented in Table 1.

A greater amount of greenhouse gas emissions was estimated for dry bean production compared to soybean and field pea production. This is because an application of 60–70 lbs acre-1 of actual nitrogen was included in the dry bean analysis and no nitrogen fertilizer was included in the soybean and field pea greenhouse gas calculations.

Reducing Greenhouse Gas Emissions and Carbon Sequestration

The majority of estimated greenhouse gas emissions associated with producing these crops are from the production, delivery, and application of synthetic nitrogen fertilizers. Including crop species in rotation that acquire nitrogen on their own, like field pea and soybean, will reduce overall greenhouse gas emissions on a farm. For soybean, the development of early maturing varieties that successfully complete their life cycle in Manitoba's short growing environment has led to increased production of this crop and is promising for new environments where soybean production is uncommon. Additionally, new local field pea processing facilities have been developed highlighting the strong demand for this alternative source of protein.

The 4R fertilizer management practices should be followed if a nitrogen application is required to produce these crops. This involves applying nutrient sources at the right rate, source, timing, and placement, and begins with accurate soil testing and a nutrient management plan for each field. Farmers are encouraged to work with crop production advisors and agronomists with an accredited 4R designation to develop robust nutrient management plans for each field. These plans should be reviewed often.

The investigators of this project also noted the following technologies and management practices have strong potential to further reduce greenhouse gas emissions:

- Reduced, variable depth, strip, and prescribed tillage
- Automated guidance systems
- Controlled traffic farming
- Alternative energy sources

Some of these technologies and management practices are already used by Manitoba farmers. Further research into alternative tillage strategies, particularly in cropping systems that manage high residue in often wet conditions like southern Manitoba, is encouraged. The development of alternative energy sources for farm machinery is well underway but requires more research and testing. ■

Grain and Forage Legumes in Sustainable Crop Production

Mario Tenuta, Senior Industrial Research Chair in 4R Nutrient Stewardship, Department of Soil Science, University of Manitoba

CLIMATE SCIENTISTS HAVE an overwhelming consensus that greenhouse gases (carbon dioxide, methane and nitrous oxide) emitted from human activity has resulted in an unprecedented increase in global mean atmospheric and ocean temperatures. The consequences to Manitoba of warmer winters, shorter duration of northern ice roads, extremes in moisture and drought-increased forest fires seem less severe than for other regions where sea level rise will inundate 10s of millions of homes if not protected. However, this article is not about doom and gloom but rather about what we can do to reduce emissions in growing food.

Canada, among many other countries, is committed to reducing greenhouse gas emissions to help lessen the impact of future warming. The commitment is 40% by 2030 of 2020 levels. Canada's approach to reducing emissions is to have all economic sectors contribute, some more than others. The commitment for agriculture is less than for other sectors being a 30% reduction of nitrous oxide (N_2O) emissions from nitrogen fertilizer applied to the soil. Nitrous oxide emissions from manures and crop residues are not on the table, as aren't methane emissions from livestock and manure. The reduction of N_2O is a voluntary target for the agriculture sector. Nitrous oxide emissions comprise about 5% of greenhouse gases emitted in Canada. It seems like a small amount, but the majority of those emissions come from nitrogen addition to soil.

Nitrous oxide emission from soil is a natural process produced by native soil bacteria utilizing any form of available N from synthetic fertilizers, manure, residues and decaying fresh plant roots and matter. Nitrogen fertilizers are targeted because their consumption increases steadily with better varieties and hybrids, and there are many management options for farmers to reduce the amount of emissions from their use.

Canadian farmers are good stewards of land and among the best in the world in adapting and meeting challenges to improve the sustainability of their farms. I see achieving N_2O reductions from fertilizer use to the advantage of growers where our grains are marketed globally. Nitrogen fertilizers are the largest, if not

Soybean - a grain legume - emerges on minimal-tilled soil

Photo Credit – Toban Dyck

among the greatest operational cost of crop production, losses of nitrogen mean lost profit, and reducing N2O emissions signals to the Canadian public and global markets that our commodities are sustainably produced.

Increasing grain and forage legume production is a key strategy, such as using advanced 4R practices to achieve emission reductions. Let's review the past and future benefits of pulse, soy and forage legume production to reduce nitrous oxide emissions.

Teams of researchers with Agriculture and Agri-food Canada across the Prairies using long-term field studies have shown total grain production, protein production and efficiency of N utilization in crop production to be improved by including pulses such as field pea, lentil and chickpea. The benefits stem from pulses contributing to less summer fallow, free N from the legumes, and increasing rotation lengths to reduce disease issues. In particular, the introduction of pulse production and canola and direct seeding/no-till led to a dramatic decrease in intentional summer fallow starting around 1970 and really picking up steam by 1980. In Manitoba, soy acreage has risen since the turn of the new millennium. The Manitoba crop insurance data (2011-2020) shows that the major field crops, navy beans (10% increase) and soybeans (6%) in rotation, increase the yield of subsequent crops the most.

An example of the soil carbon gains from the removal of fallow and replacement by pulses is a ten-year study from Agriculture and Agri-food Canada colleagues at Swift Current. From 1995 to 2005 removal of fallow in a three-year rotation with pulses (field pea, lentil and chickpea) increased soil organic carbon by 200 kg/ha in the top 6" of soil. That's a considerable increase for a dry climate. In Manitoba, an increase in soil organic carbon is most prominent in West Man, where no-till and field pea are more common.

The work of colleagues at Agriculture and Agri-food Canada Lethbridge shows that grain and forage legumes biologically produce a considerable amount of nitrogen. In total, 0.9 million metric tonnes of N are produced by legumes across Canada annually. That is equivalent to 90% of the synthetic nitrogen fertilizer used in Saskatchewan in a year, Canada's largest consumer of N fertilizer. The greenhouse gas emission reduction from having bacteria produce the N compared to manufacturing using natural gas is astounding, being 8 million metric tonnes of CO_2 per year and reducing greenhouse gas emissions in Canada by 1.2%.

Grain and forage legumes that produce their own N also reduce greenhouse gas emissions. Our research sponsored in part by Manitoba pulse & soybean growers, has shown soybean, fababean and alfalfa to emit little more N_2O than field crops such as spring wheat grown without any N fertilizer added. In essence, emissions are very near background or what the soil produces from mineralization and subsequent N transformation in soil organic matter. In fact, of many management practices examined to date by our team, soybean, pulse and forage legumes that produce their own N reduced N_2O emissions from soil by 61% compared to N-fertilized field crops. The legumes' emissions that still amount to 39% are actually that background level from soil organic matter. The next best practice to reduce emissions is split application of fertilizer N (part at plant and part at early vegetative stages) of field crops for a 48% reduction with enhanced efficiency fertilizers such as nitrification inhibited and polymer-coated urea products coming in with around a 30% reduction.

So soybean, forage legumes and pulses that don't receive N fertilizer are important for reducing nitrous oxide emissions. Recent work by Kristen MacMillan at the University of Manitoba strongly indicates dry beans are better N producers than previously thought, where it doesn't pay off to apply N. That is an additional 182,000 acres of cropland for Manitoba in dry beans that could not be producing greenhouses from manufacturing fertilizer and nitrous oxide emissions from soil to add to the already 1.3 million acres of soybean and 170,000 acres of field peas not receiving N.

The benefit of reducing N_2O emissions by growing legume crops was evident as N_2O emissions from field crops in Manitoba levelled off the mid-last decade. My modelling for major field crops in Manitoba (wheat, barley, oats, canola, corn and soybean) showed that nitrous oxide emissions levelled as soybean acres peaked in 2017. The drop in soybean acreas from 2017 resulted in a big increase in nitrous oxide emissions. In effect, the increased soybean acres replacing cereals balanced an increase in emissions from more N being applied to canola in the province.

Can we achieve a 30% reduction in nitrous oxide emissions from field crop production in Manitoba from fertilizer use? Yes, we can, but a few approaches will be taken together. Clearly, 4R practices such as split application, enhanced efficiency products, and emerging technologies such as variable rate N and enhanced efficiency products applied to management zones are important. Particularly reducing barriers to their use, such as costs. However, I believe even more reductions are possible to offset possible increasing N rates are crop yields continue to increase from increasing the area of soybean and pulse production in Manitoba. Market demand for plant proteins and edible oils will need to drive that increase in pulse production with decisions by growers to decrease production costs by lowering their fertilizer bills. ■

Agriculture in the Classroom Manitoba Aims to Shape Informed Students with Early Spring Experiences

John Gaudes, Communications Manager, Ag in the Classroom Manitoba

WITH A NEW year underway, Agriculture in the Classroom Manitoba (AITC-M) is set to bring a number of direct experiences, classroom resources, and teacher training opportunities to school divisions across Manitoba.

The start of a year is always a fun and exciting opportunity to get offerings into classrooms and engage with students, but there's also a greater sense of purpose for Katharine Cherewyk, executive director of AITC-M – one that has to do with public trust.

"We see that our future decision-makers, briefing-note writers, regulators, and consumers are in classrooms right now," says Cherewyk. "Because of that, we ensure that our programs are high-quality, fun and educational, and tell the story of where our food comes from. But we also know we have a serious job to do. We have the opportunity to shape future critical thinkers and advocates of agriculture regardless of whether they end up working in the industry or not. We are committed to working with as many educators and partners as possible to ensure that a diverse Manitoba agricultural industry is valued by all now and in the future.

In the last five years, AITC-M has steadily increased the number of teacher "champions" they work with in the province – champions who decide to make agriculture education a part of their classrooms.

"Our teacher-champions carry the message for us every day," says Cherewyk. "Every time a class turns over, every time a new student enters the room – teacher-champions carry the message encouraging students to learn more about agriculture."

Canadian Agriculture Literacy Month (CALM) in March is just one of the exciting programs on the way from AITC-M this spring, but it promises to be a highlight.

Over 300 classrooms will have in-person visits from producers and agriculture professionals for the first time in three years. CALM volunteers will bring hands-on activities, an agriculture-themed book, and their own agriculture story to Grade 2–4 classrooms across the province.

Every year for CALM, AITC-M chooses a theme for classroom visits. This year, volunteers will look at sustainability through the lens of food loss and waste. Students will learn about how to avoid food waste at home, and how producers and other industry professionals work to limit food loss and waste in their everyday work.

"We're excited to have CALM starting in March and that we've said yes to every teacher who requested a visit in 2023 by matching them with passionate volunteers," says Cherewyk. "The industry stepped up in a huge way, and it's great that this farm-to-food connection is happening in person once again."

The connection between producers and students doesn't end in March, though. Follow the Farmers concludes its second season of livestream farm tours on April 19, as Grade 3–6 students will visit Andre Steppler's farm in Miami, Manitoba to learn about beef production.

Each Follow the Farmers livestream includes a farm tour, a Q&A session between students and the farmer, and classroom activities directly linked to the curriculum to extend student learning. We are excited to announce that season three of Follow the Farmers will include the story of soybeans to the mix of virtual farm tours!

"We've had such a great response to Follow the Farmers since launching it in 2021, and have to send a big thank you to Penner Farm Services for being our video sponsor and Manitoba Beef Producers for helping make this last event possible," says Cherewyk.

Also in April, AITC-M is connecting high school students to agriculture careers through the second annual thinkAG Career Expo.

This half-day event brings AITC-M staff, volunteers, and partners to a high school where Grade 9–12 students cycle through stations and presentations showing off the endless career and entrepreneurial opportunities in agri-food.

"Students appreciate seeing themselves in agricultural careers rather than just thinking agriculture is about farmers," says Braden Zborowsky, a teacher at Kildonan-East Collegiate in Winnipeg whose students attended the first thinkAG Career Expo in November 2022. "The hands-on learning experiences were also great!"

Also in April, season two of the Great Canadian Farm Tour kicks off an 11-province tour that includes a stop in Manitoba to visit a chicken farm as part of an 11-province tour. The Agriculture in the Classroom Canada program encourages students to learn about Canada's agriculture and food story while experiencing what it's like on farms across the country.

"All these experiences are meant for students to remember discovering agriculture in elementary school, becoming more aware in middle school, and then challenged to think critically in high school so that when they graduate in 2030, 2050, and beyond, they KNOW agriculture, THINK agriculture, and FEEL connected to agriculture and make informed decisions for the rest of their lives," says Cherewyk.

"We can't do any of this work without the support of our funders like the Manitoba Pulse & Soybean Growers, so a big thank you goes to you. Over 75% of our funding is from individuals, commodity partners, and other industry organizations who renew their support every year. We won't get to 2030, 2040, or 2050 without your support – so thank YOU!"

To donate to AITC-M and hear more from teachers about their experiences, resources, and training, head to aitc.mb.ca ■

Here I am in our record soybeans that yielded 54 bu/ac across the farm. It was exciting to see 60-bushel yield potential but yield limiting factors white mould and phytophthora root rot robbed the last 10%.

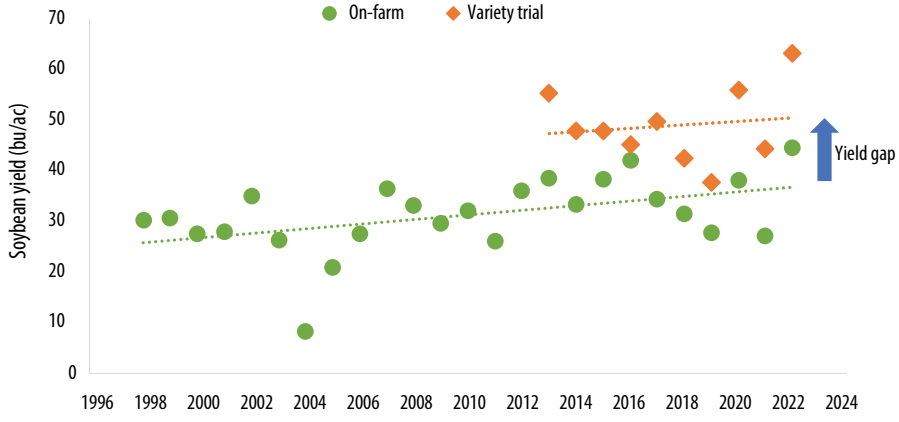
Sixty-Bushel Soybeans: Exploring Yield Potential

Kristen P. MacMillan, Agronomist-in-Residence, University of Manitoba/MPSG

THE ADAGE "RAIN MAKES GRAIN" certainly held true for soybeans in 2022. Following a historic drought across the prairies in 2021, soybean yield potential was realized across many regions of Manitoba in this past growing season with a provincial yield record of 45 (bu/ac). The previous record was 42 bu/ac in 2016. Soybean is a high water use crop and it's yield performance greatly reflects moisture availability. With renewed enthusiasm, it's time to explore yield potentials and the opportunity for 60-bushel soybeans.

Yield potential non-limited is the yield of an adapted crop in a local environment where water and nutrients are non-limiting; diseases, insects, and weeds are effectively managed; and overall best agronomic practices are used to maximize yield. Yield is only limited by genetics and atmospheric conditions (i.e., temperature, CO_2, solar radiation). However, here on the prairies where we are dependant on rainfall for water availability, *yield potential water-limited* (Y_p) is a more useful benchmark. As we explore what Yp looks like for soybeans in Manitoba, our starting point is *actual farm yield* (Y_f). At the farm and field level, multiple limiting factors (in addition to moisture) determine how we manage the crop. Pests, nutrition, and agronomic practices prevent us from reaching yield potential (Y_p).

Let's begin a crude analysis of those numbers for Manitoba. A look at historical on-farm soybean yield takes us back to 1998. Over the past 25 years, soybean yield has increased by 0.45 bu/ac/year and the 10-year average soybean yield is 36 bu/ac (Y_f). How does that compare to our yield potential? There are several methods used to quantify yield potential, but the most accessible data is that from variety trials and research plots. In small-plot research, we choose uniform, highly productive areas of the field; manage pest pressure; and use best management practices. So, we can expect yields in research plots to surpass farm yields and provide a reasonable estimation of soybean yield potential (Y_p) for Manitoba. The 10-year average soybean yield among four small-plot variety trial locations is 49 bu/ac.



Historic on-farm soybean yield (1998–2022, MASC) and small-plot variety trial yield (2013–2022) in Manitoba

The difference between on-farm yield (Y_f = 36 bu/ac) and variety trial yield (Y_p = 49 bu/ac) can be referred to as the *yield gap.*

Based on this crude analysis, the yield gap for Manitoba soybeans is around 13 bu/ac or 36%. Yield gaps reported for major crops around the world range from 20–40%. Crop yields achieved at the farm level will never close the yield gap entirely, but there is the *exploitable yield gap,* which is defined as the attainable yield increase through refinement of management practices. The exploitable yield gap is likely between 10% and 20%. This means we should be able to reach a long-term provincial soybean yield of 39–43 bu/ac.

In Manitoba, soybean moisture deficit is the primary limiting factor for both Y_p and Y_f. Soybean yield has been strongly correlated to growing season precipitation, both in small-plot and on-farm. Generally, an inch of rain produces about five bushels in small plot/ultra high yielding environments and about three bushels at the farm level. Precipitation is an easily available parameter, but soil moisture availability is likely more accurate since it accounts for variation in soil characteristics that impact how well the crop uses precipitation (e.g., infiltration and water holding capacity). Thus, soybean yield (and crop yield in general) within a region and field is highly variable depending on soil.

To overcome the exploitable yield gap, the primary yield-limiting factors related to agronomy need to be identified and understood. Through a comprehensive farm survey, we could compare management practices among high and low yielding farms (this may

continued on page 33

Hassle-free simplicity.

ADVANCED WEED CONTROL

Tough-to-control weed populations will continue to grow if best management practices aren't used. And that's where the Advanced Weed Control program and its Performance Support Guarantee provides you with peace of mind. Advanced Weed Control is a simplified, complete weed management solution. It provides you with a list of solutions you can select from and combine across a season to best suit the weed challenges you expect to have in your fields. These product combinations have been identified as leading chemistries you can trust that work together to provide your crops with multiple modes of action and an effective herbicide resistance management program.

The option to apply new Voraxor® Complete herbicide in the spring prior to seeding peas or lentils, and having Zidua® SC herbicide applied in the fall ahead of lentils are the two newest additions to the program. Voraxor Complete offers an effective one-two punch of consistent burndown and extended residual activity prior to seeding peas or lentils. A fall application of Zidua SC ahead of lentils gives you a head start on next season's spring cleaning.

We'll cover up to 100% of respray support costs.[1]

We aren't done until weeds are. The Advanced Weed Control program comes with a Performance Support Guarantee that offers hassle-free support in the unlikely event of weed escapes.[1] That even includes resistant biotypes, wild oats, kochia, cleavers and flushing weeds.[2] Eligible Growers can receive up to 100% of the BASF respray purchase value[3] to correct the specific weed problem in each field.

[1] When recommended products are used up to labelled guidelines.
[2] When adhering to specified rates outlined in the product label for the weeds outlined in the program.
[3] Calculated at the Suggested Retail Price (SRP).

The simplicity of our support.

Here's how growers can make a claim in the unlikely event of weed escapes as part of the Performance Support Guarantee:

- Call **AgSolutions®** Customer Care at 1-877-371-BASF (2273)
- Claims must be made before July 15 or within 3 weeks of application
- You can check the status of their claim by calling 1-877-371-BASF (2273)
- BASF will contact the grower directly when their claim has been fully reviewed, investigated and resolved

Re-spray options available.

CANOLA	LENTILS	PEAS	SOYBEANS	CORN
Centurion[4] Herbicide Liberty 150 SN[4,5] Herbicide Heat LQ Powered by Kixor Herbicide	Heat LQ Powered by Kixor Herbicide Centurion Herbicide	Heat LQ Powered by Kixor Herbicide Centurion Herbicide Basagran Forte Herbicide	Heat LQ Powered by Kixor Herbicide Centurion Herbicide Basagran Forte Herbicide	Armezon Herbicide Distinct Herbicide

[4] Refer to Centurion® and Liberty® 150 herbicide labels for full list of covered weeds and specific application timing.
[5] Do not exceed maximum labelled rates for Liberty 150 herbicide per season.

Visit **agsolutions.ca/AdvancedWeedControl** for more information on the program and recommended product combinations.

Always read and follow label directions.

BASF
We create chemistry

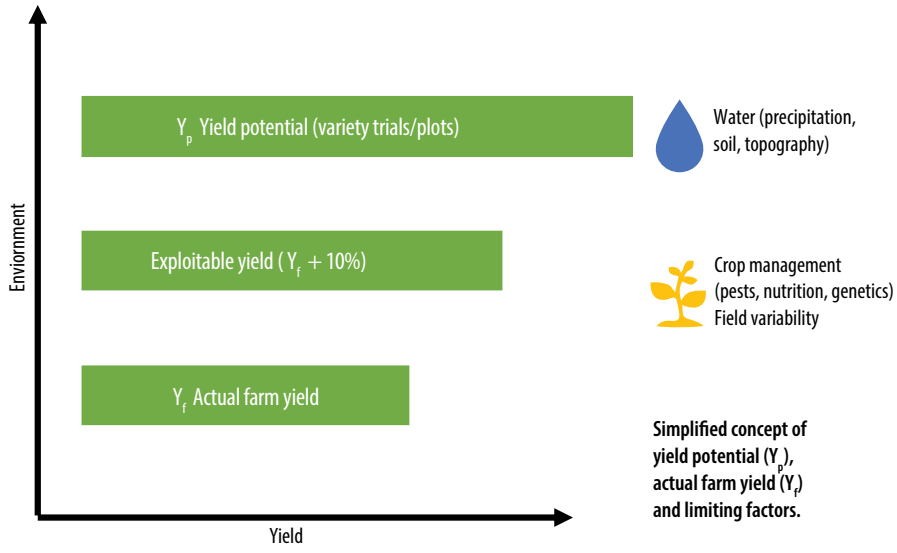
be a future research project). Farmers and agronomists could also do a self-assessment of their adoption of best management practices. Precluding adoption is the continuous assessment of the availability (is relevant research available?) and communication (is knowledge effectively transferred?) of best management practices. Variety selection, weed control, row spacing, and seed depth are easily adjusted management practices to increase soybean yield. Other yield-limiting factors that require broad integrated efforts are herbicide resistance, soil and water management, and disease management – specifically Phytophthora root rot and soybean cyst nematode.

In 2022, the moisture deficit in most regions of Manitoba was reduced and despite a very late start, soybean growers were pleased to see record yield potential. With a farm average soybean yield of 45 bu/ac (Y_f) in 2022, does that mean we reached yield potential? Not quite – yield potential is a moving target because it's driven by an environmental factor. In other words, our Y_p benchmark (variety trials and small-plot research) also received greater precipitation, thus driving Yp to a record level as well. At 63 bu/ac it's still 40% greater than the farm average.

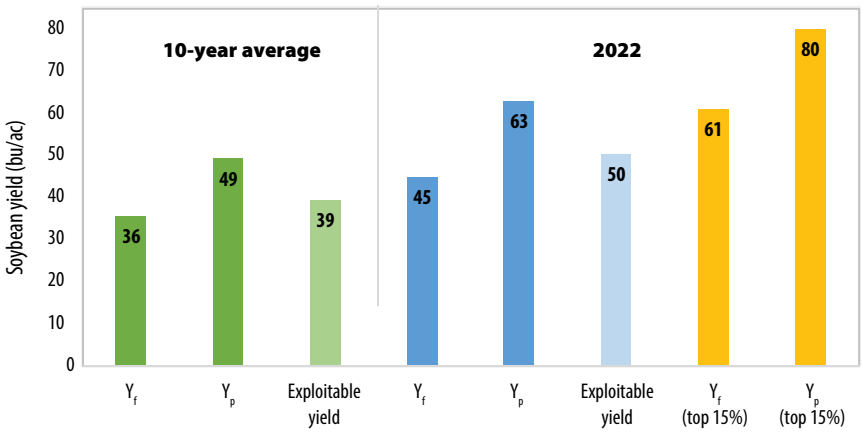
Further analysis of the 2022 yield data shows that the top 15% of soybean fields in Manitoba averaged an incredible 61 bu/ac. Indeed, sixty-bushel soybean is a realistic goal for some farms in Manitoba. Equally impressive is the top percentile of variety trial yields, which reached 80 bu/ac. So, there is certainly a range of crop yield performance that can be used to identify yield-limiting factors. Circling back to precipitation and soil moisture availability, the highest yielding soybean fields in 2022 were in the Red River Valley and east Central Manitoba. Risk Area 5 produced 49 bu/ac and the highest yielding municipality was Morris with 55 bu/ac. This generally coincides with regions that received the greatest precipitation and heat accumulation and inherently have highly productive soils.

What makes soybean unique? In three separate studies of agronomy practices, environment accounted for the most variation in soybean yield. This means that the effect of environment on yield resulted in a greater range of soybean yield than agronomic practices such as seeding date and depth. But doesn't environment account for most yield variation in all crops? Other major crops, like wheat and canola, use nitrogen, a very influential agronomic practice that accounts for much variation in yield. Wheat and canola also have an overall lower crop water demand. Thus, the effect of environment, specifically soil moisture availability, is particularly important in making soybean yield.

A review of crop yield potential and contributing factors is useful for individual farms to benchmark their production practices and yield goals. It is also important for industry, government, and academia to identify knowledge and communication gaps, and develop solutions to increase production efficiency. Overcoming the exploitable yield gap to increase yields by 10–20% through refinement of management practices is a reasonable goal.



Simplified concept of yield potential (Yp), actual farm yield (Yf), and limiting factors.



10-year average soybean yield potential (Yp), on-farm yield (Yf), and exploitable yield compared to the 2022 growing season averages and top percentiles.

Watch for Kristen's next annual report booklet of results – available at manitobapulse.ca and Kristen's U of M home page – and follow @kpmacmillanUM on Twitter to stay in touch with this research. ■

Launching the Next 5 Years of Research

Cassandra Tkachuk, MSc, PAg, CCA, Research Project Manager, MPSG

NEW RESEARCH FOR 2023–2028

The 2022 research year was at the crossroads of project finalization from the previous five-year funding period and the onset and planning of the next five years. Plans were in place by year end to initiate new projects in 2023 using leveraged MPSG funds, seeking to solve production challenges and uncover opportunities for pulse and soybean growers.

By the end of 2022, MPSG's research and production committee approved, and the organization committed $2.2 million of leveraged funds (government funding pending) to 21 new projects (Table 1). These projects are a culmination of collaborative efforts through the new federal Sustainable Canadian Agricultural Partnership (sCAP) AgriScience Program, including the Canadian Field Crops Research Alliance (CFCRA)/Soybean Cluster, Pulse Cluster, Integrated Crop Agronomy Cluster, Genome Prairie and the upcoming Canada-Manitoba sCAP program. They are also a product of close collaboration with sister organizations across Canada and within Manitoba. In addition, MPSG developed unique partnerships with local innovators to ensure MPSG's research priorities and member needs would be served for 2023 and onward.

Table 1. New, three- to five-year research projects set to begin in 2023–on (21 projects in total).

Project Title	Principal Investigator(s)	Institution or Company
Reducing the economic impact of pests		
Comparing field pea foliar fungicides.	Baljeet Singh	Assiniboine Community College
Understanding dry bean root rot and soybean cyst nematode management.	Owen Wally	AAFC-Harrow
Protecting Manitoba's soybean industry from soybean cyst nematode.	Mario Tenuta	University of Manitoba (U of M)
Accelerating solutions to root rot of peas and lentils.	Syama Chatterton	AAFC-Lethbridge
Decoding the life cycles of Fusarium species across multiple host crops.	Syama Chatterton	AAFC-Lethbridge
Prairie Weed Monitoring Network (PWMN): surveillance, risk assessment and forecasting.	Charles Geddes	AAFC-Lethbridge
Examining farming without glyphosate compared to other weed control strategies.	Robert Nurse and Breanne Tidemann	AAFC-Harrow; AAFC-Lacombe
Enhancing yield and marketable quality		
Optimizing crop rotations that include both soybeans and peas in western Manitoba (project extended).	Ramona Mohr	AAFC-Brandon
Prolonged nitrogen fixation (PNF) during periodic moisture stress to enhance yield and protein accumulation in soybeans.	Yvonne Lawley and Malcolm Morrison	U of M; AAFC-Ottawa
Breeding of short-season, drought tolerant soybeans.	Elroy Cober	AAFC-Ottawa
Breeding of pinto, navy and black beans in Manitoba for improved yield, disease resistance and seed quality.	Anfu Hou	AAFC-Morden
Breeding of peas to increase nitrogen (N) fixation, root health, protein concentration, quality and functionality and resilience to heat, drought and disease.	Tom Warkentin	University of Saskatchewan
Breeding of peas to improve yield, maturity, standability and seed size.	Dengjin Bing	AAFC-Lacombe
Genomic improvement of faba beans.	Nicholas Larkan	AAFC-Saskatoon
Developing bio-inoculants for dry beans using a genomics-driven approach to promote N fixation.	Ivan Oresnik and George diCenzo	U of M; Queens University
Characterizing the protein and amino acid composition of Manitoba-grown soybeans to support commercial value-added applications.	James House	U of M
Measuring nitrogen fixation in modern dry bean varieties and comparing N management strategies for dry beans in Manitoba.	Kristen MacMillan	U of M/AIR
Investigating the effects of pea crop rotation length on Aphanomyces root rot and the impacts of preceding crop, residue management and phosphorus management on pea production.	Kristen MacMillan	U of M/AIR

Table 1 Cont'd. New, three- to five-year research projects set to begin in 2023-on (21 projects in total).		
Project Title	**Principal Investigator(s)**	**Institution or Company**
Enhancing yield and marketable quality		
Mitigating risks associated with iron deficiency chlorosis, land rolling and weed control timing in soybeans.	Kristen MacMillan	U of M/AIR
Local screening of commercial soybean varieties and breeding populations for yield potential, nitrogen fixation and tolerance to abiotic stress.	Kevin Baron	N49 Genetics Inc.
Improving soil health		
Building resilient soils with cover crops on-farm in Manitoba.	Afua Mante	U of M
Soil and water management using tile drainage in an undulating landscape in western Manitoba.	David Whetter and Bruce Shewfelt	Agri-Earth Consulting Ltd.; PBS Water Engineering Ltd.

AGRONOMIST-IN-RESIDENCE (AIR) PROGRAM

The AIR research program led by Kristen MacMillan is a unique collaboration between MPSG and the University of Manitoba and has just been renewed for another five years. This program focuses on improving pulse and soybean profitability by bridging the gap between academic research and practical agronomic recommendations. This requires the Agronomist-in-Residence to perform both small-plot and on-farm research.

In 2022, the sixth year of the program, 14 trials were conducted addressing eight different applied research topics:

- Soybean response to iron deficiency chlorosis
- Herbicide timing in soybeans
- Long-term crop rotations for peas
- Pea response to preceding crop, residue management and P fertility
- Evaluating new dry bean inoculants
- Intercropping with soybeans and peas
- Relay cropping soybeans with winter cereals

Two new projects in 2022 included soybean herbicide timing and an assessment of the growth and development of dry beans and yellow peas in Manitoba, utilizing data that was previously collected from existing trials.

Looking to 2023 and beyond, seven individual projects under the umbrellas of three main studies will be starting as part of the next phase of this program. These include: 1) further investigation into dry bean nitrogen (N) management and inoculation, in which biological N fixation will be quantified and N recommendations will be further refined, 2) a continuation of the pea rotation and agronomy study mentioned above to capture additional site-years for accuracy and quantification of Aphanomyces root rot, and 3) a three-tiered soybean study investigating the intricacies of iron deficiency chlorosis, delayed weed control and land rolling at various development stages to mitigate the risks associated with each of these issues.

> Watch for Kristen's next annual report booklet of results – available at manitobapulse.ca and on Kristen's U of M home page – and follow @kpmacmillanUM on Twitter to stay in touch with this research. ■

The Bean Report

2022 Disease Prevalence and Management Tools

Disease Surveillance in Soybeans, Peas, and Dry Beans and On-Farm Fungicide Evaluation Results

Laura Schmidt, Production Specialist – West, MPSG

SURVEILLANCE OF CROPS across the province helps us track diseases of concern over time and keeps us abreast of any emerging disease issues to inform research priorities and advise on areas that may need further investigation.

A representative sample of soybean, field pea and dry bean fields are surveyed each year for root, foliar and stem diseases across Manitoba. These surveys are a collaborative effort between Agriculture and Agri-Food Canada (AAFC), Manitoba Agriculture and Manitoba Pulse & Soybean Growers.

The On-Farm Network (OFN) has also tested foliar fungicides in soybeans, peas and dry beans over the past several years to evaluate the frequency of yield response to these products under a range of environments.

SOYBEANS

2022 Disease Survey Results

In 2022, 54 soybean fields in Manitoba were surveyed for foliar and stem diseases at R4 (full pod) to R5 (beginning seed). Roots were collected and submitted to AAFC for root disease analysis. Soybeans were visually assessed for infection by bacterial blight, Septoria brown spot, downy mildew, frogeye leaf spot, northern stem canker, white mould, pod/stem blight and anthracnose.

Bacterial blight and Septoria brown spot were the most common foliar diseases in soybeans, infecting 91% and 81% of fields surveyed, respectively (Figure 1). Severity levels of these two diseases were below 1 (scale 0–5), indicating that only trace symptoms of disease were found. Root rots were found in every field surveyed and had an average severity of 3.8 (range: 3.4–4.2). Phytophthora root rot (PRR) was confirmed in 11% of fields surveyed.

Northern stem canker was the most common stem disease in 2022 infecting 15% of surveyed fields. White mould was not found during the survey but was more common to find in soybean fields in 2022 than in previous years.

Phytophthora Root Rot Pathotype Identification

In 2022, agronomists piloted a commercial soil test from AYOS technologies to identify PRR pathotypes in 11 farmer's fields with suspected PRR presence (Table 1). Of those 11 fields where PRR was confirmed, 100% of fields had PRR pathotypes that overcame soybean Rps genes 1a and 1c. Rps genes 1k and 3a were defeated at 55% and 64% of fields tested, respectively, and Rps 6 was defeated at

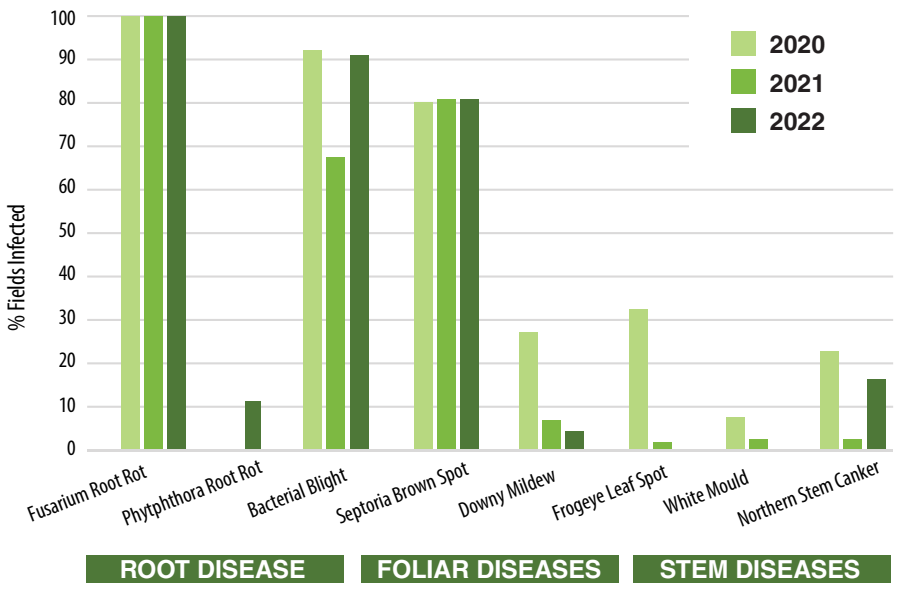


Figure 1. Prevalence (% of fields infected) of soybean diseases in Manitoba from 2020–2022.

Northern stem canker in soybeans

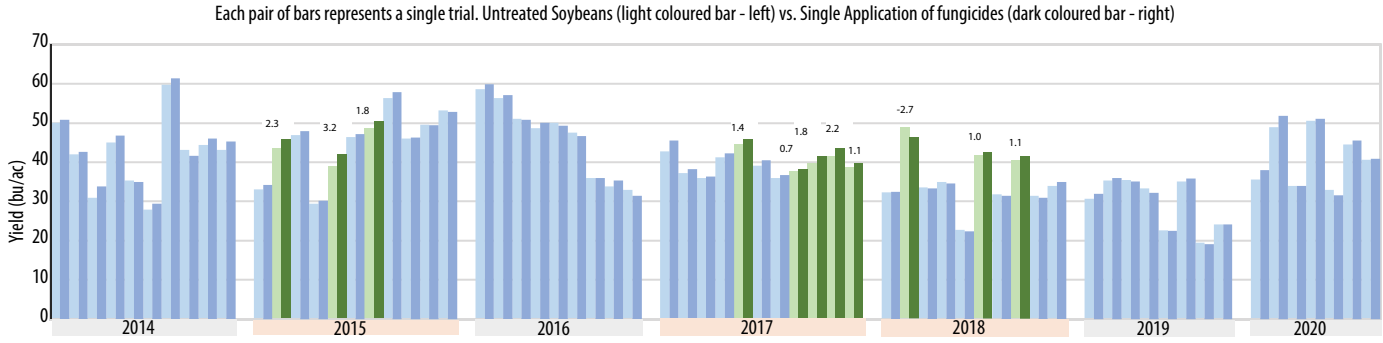


Figure 2. Soybean yield response to a single foliar fungicide application vs. none in 66 On-Farm Network trials (2014–2020). Green bars represent trials where a significant yield response to fungicide application occurred. The number above each pair of bars indicates the yield difference (bu/ac) at each trial.

Table 1. Soybean Rps genes defeated by Phytophthora root rot pathotypes in 11 fields across Manitoba. An 'x' in a column indicates that that Rps gene was defeated in that field.

Field #	Soybean Rps gene defeated					Recommended Rps gene(s) to use
	1a	1c	1k	3a	6	
1	X	X	X		X	Rps 3a
2	X	X	X	X		Rps 6
3	X	X	X	X	X	All pathotypes detected, no Rps gene available
4	X	X	X	X		Rps 6
5	X	X	X	X		Rps 6
6	X	X				Rps 1k, 6
7	X	X			X	Rps 1k, 3a
8	X	X	X	X		Rps 6
9						Rps 1k, 3a, 6
10	X	X				Rps 1k, 3a, 6
11	X	X		X		Rps 1k, 6
Percentage of samples with Rps gene defeated	100%	100%	55%	64%	27%	

White Mould Risk Assessment

MANITOBA Pulse Soybean GROWERS

Risk of disease development if warm, humid conditions persist around flowering

- Optimal temperatures: 15–25°C
- Humidity: 1–2 inches of rain within 1–2 weeks of flowering

Risk greater with thick, dense canopies (high plant populations on narrow rows)

Risk greater on fields in rotations with other susceptible crops (canola, beans, etc) and if the preceding broadleaf crop had heavy white mould infection

27% of PRR-infected fields. Soil tests to identify PRR pathotypes present in fields planned for soybeans will be an important tool to inform variety selection so farmers can choose effective Rps genes that are resistant to the PRR pathotypes present in a given field.

On-Farm Evaluation of Soybean Fungicides

Since 2014, 66 replicated and randomized field-scale trials have evaluated a single application of foliar fungicide in soybeans vs. none through the On-Farm Network. The main disease target for fungicide application in soybeans is white mould. Over the history of these trials, a single application of fungicide has resulted in a significant soybean yield response 17% of the time (Figure 2). Only six of those significant trials (9%) have resulted in a positive return on investment where the yield increase was great enough to cover the cost of the fungicide.

To determine if a soybean crop needs a fungicide application, evaluate the likelihood of white mould development. Risk is greatest if warm, humid conditions persist around flowering (15-25°C and 1-2 inches of rain within 1-2 weeks of flowering), if the crop canopy is thick and dense (plant populations above 180,000 plants/ac on narrow rows), on fields where there are several susceptible broadleaf crops in rotation (canola, dry beans and sunflowers) and if the previous crop had heavy white mould pressure leading to more sclerotia carryover.

PEAS

2022 Disease Survey Results

In 2022, 49 pea fields in Manitoba were surveyed for root diseases at R1 (early flower) and 48 fields were surveyed

continued on page 38

continued from page 37

for foliar and stem diseases at R4 (full pod). Soil samples were collected for Aphanomyces root rot detection.

Figure 3 shows root rot was found in all pea crops with an average severity of 4.2 (range: 1.4–7.4) on a scale of 0–9. Fusarium root rot was the most common root disease and detected in every field. Aphanomyces root rot was also detected in 98% of fields in 2022. (Read more about this disease on page 44).

Mycosphaerella blight was the most common foliar disease, found in 100% of fields. Severity of Mycosphaerella blight was 2.2, on average, (range: 1.0–5.1) on a scale of 0–9. Bacterial blight was present in 83% of fields and downy mildew was found in 31% of fields. White mould was found at trace levels in only 4% of pea fields.

Small-Plot Fungicide Comparison Trials

Beginning in 2022, MPSG has initiated product evaluation and comparison trials to generate simple, straightforward results for farmers. At the Parkland Crop Diversification Foundation at Roblin and at AAFC-Portage la Prairie sites, small-plot pea fungicide trials compared Delaro 325 SC, Miravis Neo 300 SE, Dyax, Acapela and an experimental BASF fungicide. These trials were conducted in partnership with Assiniboine Community College (ACC) and yield results are expected soon.

At these two sites, samples of infected peas were taken to test if the Mycosphaerella blight pathogen populations were resistant to Group 11 (strobilurin) fungicides. At Portage, Group 11 resistance was not detected in the pathogen. However, at Roblin, 20% of the Mycosphaerella blight samples were resistant to Group 11 fungicides. This confirms that the resistance mutation to Group 11s is present in some Mycosphaerella disease populations in Manitoba. Most pea fungicides contain multiple active ingredients and are still effective against this disease but using a Group 11 fungicide alone is discouraged.

On-Farm Evaluation of Field Pea Fungicides

Since 2017, 44 On-Farm Network trials have investigated pea yield response to foliar fungicide applications. Of those trials, 25 have compared a single application vs. none and 16 have compared a single vs. double application.

Among the 25 trials comparing a single application of fungicide at early flower vs. untreated strips, there have been seven statistically significant yield responses. A single fungicide application increased pea yields 28% of the time over no application (Figure 4). Yield increases ranged from 1.4-12.5 bu/ac (average: 4.6 bu/ac). Assuming a product cost of $21.25 and a pea sell price of $10/bu, five of the seven significant trials were economical, providing a return on investment of $1.75-104.08/ac (average: $36.05/ac).

During the dry years of 2019, 2020 and 2021, it was more common to ask if a fungicide application was necessary at all due to the dry growing conditions. In those years, risk of disease development was low, leading to fewer instances where foliar fungicides paid.

Among the 16 trials comparing two fungicide applications to a single pass, there have been seven statistically significant yield responses (Figure 5). Two fungicide applications increased pea yield 44% of the time, improving yield by 5.1 bu/ac, on average (range: 2.7–7.1 bu/ac). Considering the same economic assumptions as above, all seven of those yield responses were economical, providing an average return on investment of $29.70/ac (range: $5.75–50.15/ac).

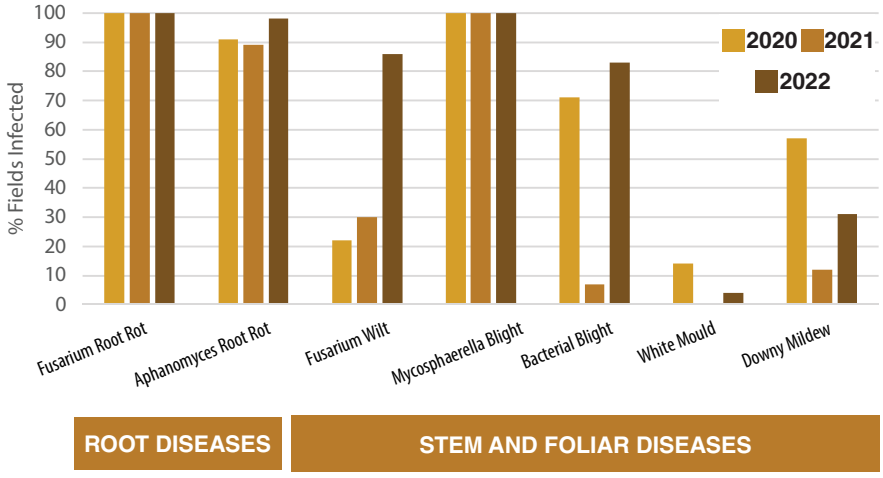


Figure 3. Prevalence (% of fields infected) of field pea diseases in Manitoba from 2020–2022.

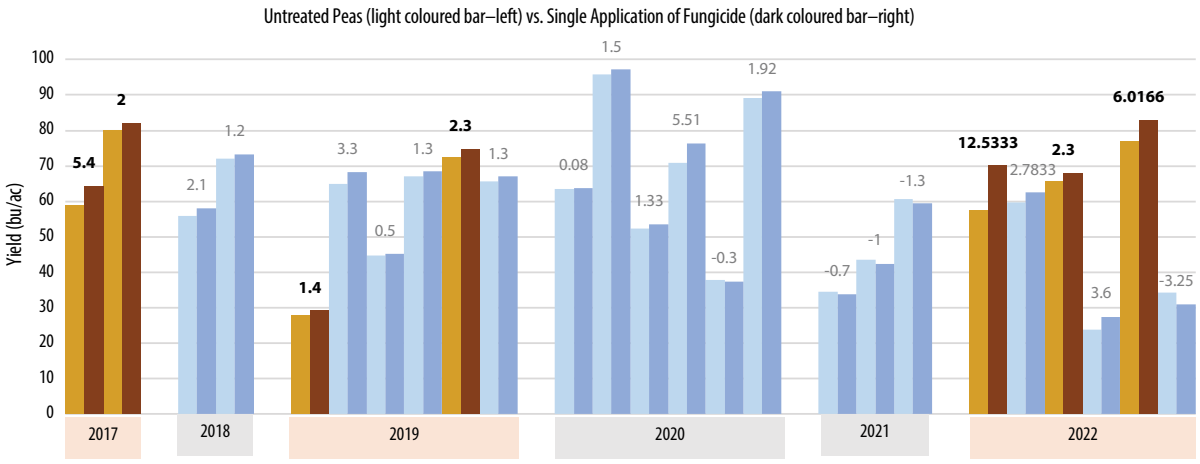


Figure 4. Field pea yield response to a single foliar fungicide application vs. none at 25 On-Farm Network trials (2017–2022). Orange bars represent trials where a significant yield response to fungicide.

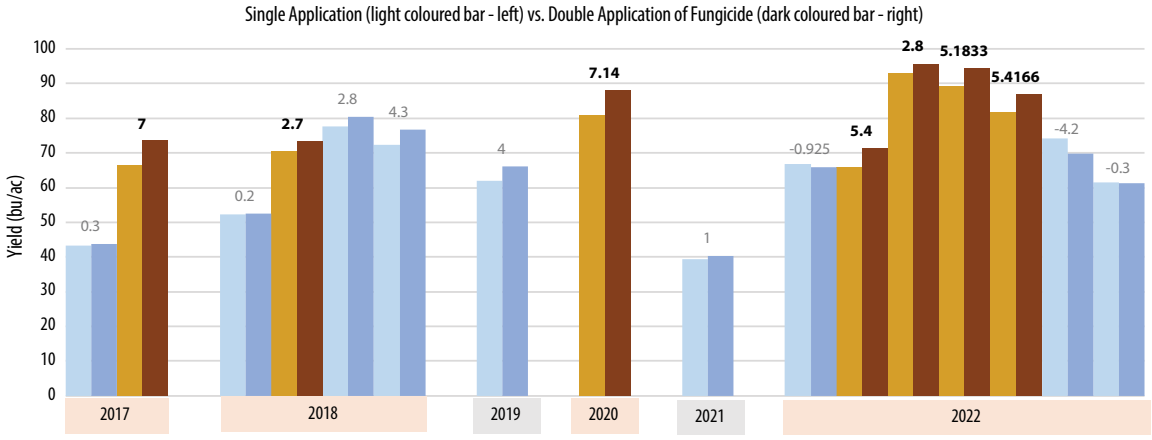


Figure 5. Field pea yield response to double foliar fungicide application vs. a single application at 16 On-Farm Network trials (2017–2022). Orange bars represent trials where a significant yield response to fungicide application occurred. The number above each pair of bars indicates the yield difference (bu/ac) at each trial.

To determine if a fungicide application is likely to be beneficial in-season, consult MPSG's *Fungicide Decision Worksheet for Managing Mycosphaerella Blight in Field Peas.*

DRY BEANS

2022 Disease Survey Results

In 2022, 27 dry bean fields in Manitoba were surveyed during mid-July to early August for root diseases and during late August for foliar and stem diseases (Figure 6).

Fusarium root rot was detected in 100% of fields surveyed with an average severity of 4.0 (range: 3.4–5.2) on a scale of 0–9. Common bacterial blight was the most common foliar disease, found in every dry bean crop surveyed with an average severity of 1.1 (range: 0.3–2.7) on a scale of 0-5. Bacterial brown spot, a disease that was added to the survey this year, was the next most common foliar disease observed in 89% of fields with an average severity of 1.6 (range: 0.7–3.0) on a scale of 0-5. White mould was found in 57% of dry bean fields and the average percentage of plant tissue infected (stems and pods) was 6.5%.

On-Farm Evaluation of Dry Bean Fungicides

Since 2016, a single application of foliar fungicide applied at R2 (early pin bean) has been compared to untreated dry beans at 16 On-Farm Network trials. White mould and anthracnose are the main disease targets of foliar fungicides in dry beans.

Until 2022, trial sites were dry and did not have white mould disease pressure present, resulting in no statistical difference between treated and untreated strips. In 2022, there was a positive yield response of 175 lbs/ac to fungicide application, however, no white mould nor anthracnose were detected in the trial at R4 when disease ratings were taken (Figure 7).

To determine if a fungicide application is likely to be beneficial in your dry bean fields, use the Fungicide Decision Worksheet for Managing White Mould in Dry Beans to asses disease development risk. A research project led by Dr. Baljeet Singh at ACC has been underway to develop a weather-based fungicide application decision support tool for dry bean farmers in Manitoba. ■

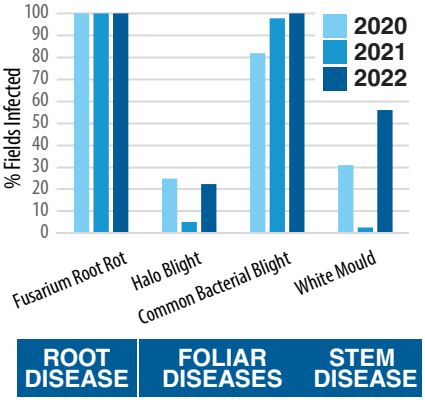
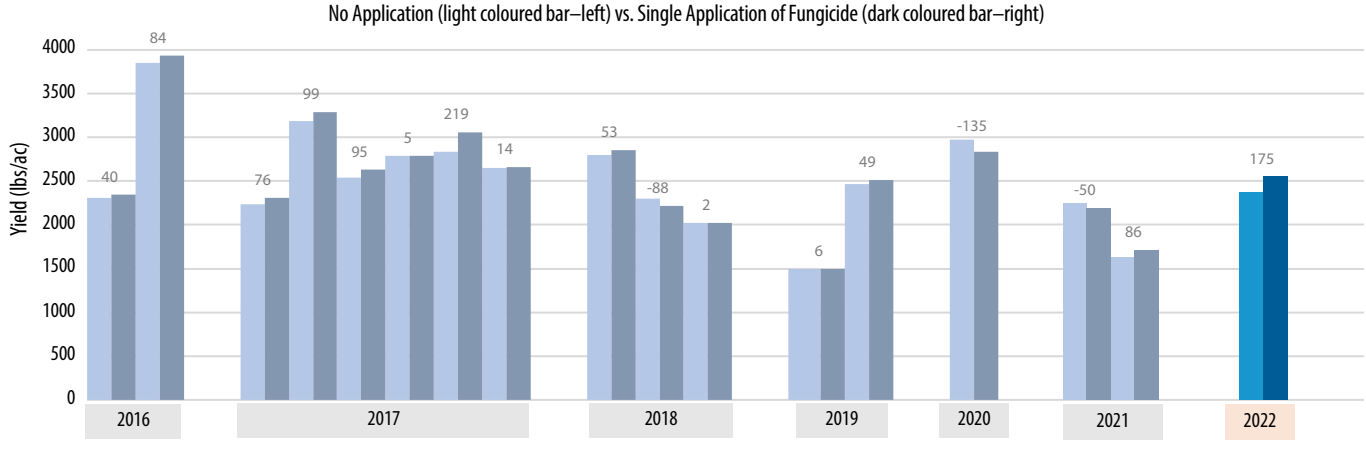


Figure 6. Prevalence (% of fields infected) of dry bean diseases in Manitoba from 2020–2022.

Figure 7. Dry bean yield response to a single foliar fungicide application vs. none at 16 On-Farm Network trials (2016–2020). Bright blue bars represent trials where a significant yield response to fungicide application occurred. The number above each pair of bars indicates the yield difference (bu/ac) at each trial.



Soybean Inoculant – Why It's Important and When to Minimize Its Use

Leanne Koroscil, former On-Farm Network Agronomist, MPSG

SPRING THAW IS around the corner, and soon the snow in the fields will be replaced with tractors, seed and various spring inputs. The type, quantity, and timing of inputs will influence the seasonal outcome and remain an important aspect of short- and long-term planning, year after year. One of the key decisions a soybean farmer should make involves inoculation. What form of inoculant (liquid, peat, granular) should be used? Is it economical to reduce a double inoculant application to a single application, given the field history? All critical questions to reflect on as the growing season approaches.

THE INS AND OUTS OF SOYBEAN INOCULATION

Soybeans have an amazing ability to fix nitrogen (N) through a symbiotic relationship with soil bacteria called *Bradyrhizobium japonicum*. *B. japonicum* are activated by chemical compounds (otherwise known as root exudates) released from soybean roots, which trigger *B. japonicum* to release compounds detected by soybeans in turn. For the following two to three weeks, these compounds signal fine root hairs to wrap around the *B. japonicum* and capture them in what will soon become a nodule.

Nodules can be cut in half and examined for pink or red colouring caused by the oxygen-carrying protein leghemoglobin. Much like hemoglobin in blood, leghemoglobin turns colour when exposed to oxygen. Grey or white nodules indicate that biological N fixation has not begun; pink or red nodules indicate that the nodule is actively fixing N.

Once actively fixating, soybeans fix, on average, 58% of their own N requirement. Crops with the ability to biologically fix N, such as field peas and faba beans, relate to different species of rhizobium. Soybeans specifically have a relationship with the bacteria, *B. japonicum*, though other strains such as *B.elkanii* have been noted. However, soybean rhizobia are not native to Manitoban soils and a compatible inoculant should be used in fields with little to no history of soybeans.

A study funded by Manitoba Pulse & Soybean Growers (MPSG) and researched by Patricia Ordonez and Dr. Ivan Oresnik at the University of Manitoba examined the longevity of *B. japonicum* in Manitoban soils. Predictably, populations of *B. japonicum* declined in relation to the time since the last inoculated soybean crop (Figure 1). However, cropping history mattered. At sites with soybean history (Carman and St. Adolphe) populations declined much more slowly than at Melita, a site with no soybean history prior to this research.

INOCULATION STRATEGIES

Inoculant is available in a variety of forms including liquid and peat on-seed, and granular in-furrow. Each varies in cost, the proximity to the seed during placement, and the length of time the inoculant product survives in the field when faced with adverse environmental conditions. A double inoculation strategy is typically used for first- or second-time soybean fields. In this scenario, two different inoculants or placements are used, such as liquid on-seed plus granular in-furrow, to ensure proper introduction of rhizobia to the soil.

Once a soybean field has been inoculated for a minimum of two years, a farmer may consider reducing their strategy to a single application for economical reasons. Before reducing inoculation strategies, MPSG strongly encourages using the checklist below since crop nutrition, environment and soil conditions can all influence nodulation (Figure 2). An On-Farm Network (OFN) field-scale inoculant trial can also offer additional insight using your own equipment, fields and production practices unique to your farm.

ON-FARM NETWORK INOCULANT TRIALS

OFN inoculant trials were initiated to quantify the agronomic and economic impacts of different inoculant strategies in soybeans. There are two types of inoculant trials: 1) double vs. single inoculation, and 2) single versus no inoculation. Double vs.

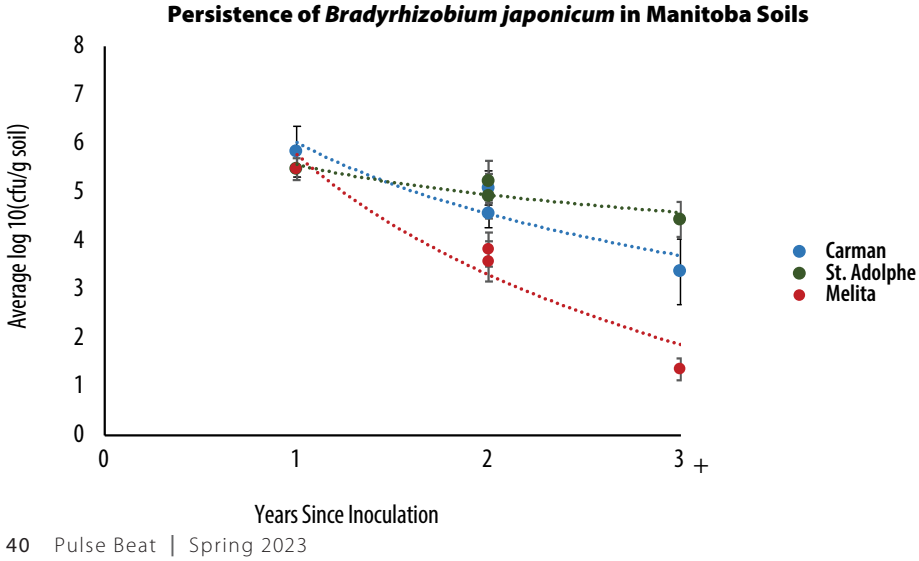


Figure 1. Population of Bradyrhizobium japonicum over years since last inoculation. Data are from soil samples collected before planting each year. Carman and St. Adolphe sites had a history of soybeans while Melita did not.

Nodule broken open to show pink active N fixation.

Photo Credit – MPSG

single inoculant trials require a minimum field history of two previous soybean crops to ensure proper *B. japonicum* populations are established, while single versus no inoculant trials require a minimum field history of three previous soybean crops. For both inoculant trial types, a soybean crop must have been grown on the chosen field sometime within the last four years.

In-season measurements include plant counts to monitor the population in relation to the actual seeding rate, nodulation ratings to evaluate the efficacy of the inoculant, yield collection to determine the effect of inoculant on soybean yield and protein analysis to examine the effects of inoculant on protein levels within the soybean seed.

Over the last 10 years, there have been 49 double vs. single inoculant trials tested on farm through the OFN. At three of these trials, a significant positive yield response was attributed to the double inoculation strategy, meaning a double inoculant strategy paid only 6% of the time on fields with soybean history.

Positive yield responses in agricultural research are eye-catching and can occasionally be misunderstood as a sole defining factor for valid scientific results. On the contrary, a lack of yield response in certain trials can actually be beneficial. For instance, the OFN has conducted 38 single vs. no inoculant trials since 2016 and there has not been a significant yield response to inoculation in those fields with more soybean history.

The lack of yield responses in both inoculant trial types can inform farmers that it is feasible to reduce their inoculation strategies in following years provided the field has enough soybean history.

If these results interest you, consider running an OFN inoculant trial using your fields, your equipment and your practices. To discuss the OFN trials, contact Ian Kirby at 204-751-0135 or ian@manitobapulse.ca. ■

CHECK-LIST FOR SINGLE INOCULATION

- ○ Field has had at least two previous soybean crops
- ○ Previous soybean crops have nodulated well
- ○ Most recent soybean crop within the past four years
- ○ No significant flooding or drought
- ○ All four above criteria have been met

Figure 2. Four criteria to consider before using a single inoculation strategy.

A New Diagnostic Tool for Accurate and Simultaneous Detection of Multiple Soybean Root/Stem Diseases

Bryan J. Cassone Ph.D., Brandon University

SOYBEAN AND ITS ROOT/STEM DISEASES

Like all crops, soybean plays host to a variety of disease-causing microorganisms (called pathogens), which can decrease harvesting yields and impact seed quality. Although Manitoba has not yet experienced the same reductions in yields due to these pathogens as other North American soybean growing regions, it is imperative that we continue our efforts to enhance crop protection to prevent these diseases from becoming a serious issue in the near future. Timely and accurate detection of pathogens is one of the important parts of disease control and management. Of particular concern are soybean diseases caused by root/stem pathogens. Notable in the province are the fungal or oomycete diseases root/stem rot (Phytophthora sojae), white mold (Sclerotinia sclerotiorum), pod/stem blight (Diaporthe phaseolorum) and fusarium root/stem rot (Fusarium oxysporum). These four pathogens are the focus of our diagnostic tool.

WHAT ARE THE ISSUES WITH CURRENT DISEASE DIAGNOSTICS?

Annual disease surveys are carried out in Manitoba, which mostly rely on visual inspection of symptom development. While quick, easy and cheap, this often results in incorrect diagnosis or inaccuracies among surveyors. For instance, stem rot caused by *Fusarium oxysporum* and *Phytophthora sojae* can be very challenging to distinguish visually, even by experienced surveyors (Figure 1). Our recent BU pilot study indicated that less than 25% of these visual identifications were accurate. Further, it is impossible to identify co-infections (more than one pathogen infecting a plant), which we have found to frequently occur in the field. In some cases, traditional microbiology techniques (e.g., morphology, motility, sporulation and staining) are incorporated into surveillance activities, though its application is limited by the inability to culture some pathogens and the time between tissue collection and diagnosis.

DEVELOPMENT OF THE DIAGNOSTIC TOOL

Field collection, pure culture isolations

Soybean fields throughout Manitoba were surveyed in 2020 and 2021 to collect symptomatic plant tissue samples for this study. The four targeted pathogenic microorganisms were isolated from stem and roots in the laboratory and grown in pure culture. Basically we grow them in petri dishes supplemented with nutrients that the microorganisms need to survive outside of their natural habitat of soybean.

Diagnostic tool development

A series of molecular biology steps and relevant troubleshooting was required for development of the disease diagnostic tool:

1. RNA extractions from each laboratory isolate and first-strand cDNA synthesis by reverse transcription. The cDNA is a reduced part of the pathogen genome – the "molecular fingerprint" – that allows us to much more accurately identify the pathogen than by just visualizing it.
2. Probe/primer set design and optimization. The cDNA is still many thousands of nucleotides (A, T, C and G's), making it impractical to work with. Therefore, the next step is to find a smaller region of the cDNA of just hundred or so nucleotides that can 1) accurately detect only the targeted pathogen and no other organisms and 2) uniquely identify the targeted pathogen in a reaction consisting of several other soybean pathogens. Using computers and specialized software, we examine many different cDNA regions for specific properties and the exceedingly small number that pass this filter must then be empirically verified to (A) detect the pathogen in the pure cultures (this is done by conventional PCR) and (B) detect the pathogen but not the other pathogens in the same reaction (this is done by singleplex RT-PCR).
3. Standard curves for quantification of pathogen cDNA. The chosen cDNA region of each pathogen undergoes ten 2-fold serial dilutions to construct standard curves. These dilutions give us a frame of reference of how much pathogen is in each sample, which is needed in situations where we want to know how infected a given sample is with the pathogen.
4. Multiplex assays. Molecular methods are already available for some soybean pathogens that can successfully identify it in an infected sample. However, these are currently limited to testing only one pathogen at a time. If your visual diagnosis is incorrect, the test will not work. Further, if the sample is infected by more than one pathogen you will not be able to resolve this. Multiplex assays allow us to test for multiple pathogens in a given sample. This is like a paternity test for plants where you can test four potential fathers at the same time – with the unusual caveat that all four tested could be the father. We developed these assays to detect (and quantify) up to four stem/root pathogens simultaneously using an approach called RT-qPCR.

Validation with infected soybean

Most farmers are not concerned with identifying pathogens growing in petri dishes. The purpose of the diagnostic tool is to be able to determine which pathogen(s) is/are causing disease(s) in soybean fields. We therefore needed to ensure that the developed tool can also detect the targeted pathogens in infected soybean tissues. We first validated the diagnostic tool by artificially inoculating soybean with known stem/root pathogens in the laboratory and testing whether it could identify single and co-infections in

Figure 1. Symptoms of root rot caused by Phytophthora sojae (left), Rhizoctonia solani (middle) and Fusarium oxysporum (right) can be very difficult to discern in the field. Photos were previously published in the Soybean Disease Diagnostic Series, 2021, by S. Markell and D. Malvick.

the developing plants. Once confirmed, we validated our tool using symptomatic and asymptomatic soybean stems and roots collected directly from Manitoba soybean fields at various growth stages.

WHAT ARE THE BENEFITS FOR FARMERS?

Fungicide seed treatments are being used by farmers without knowledge of whether the targeted pathogens are present in their field. Not only is this a waste of money on an unnecessary fungicide, the process may create regulatory concerns that jeopardize the availability of the product for times when they are actually needed. Our diagnostic tool can simultaneously detect up to four of the most common and economically important fungal and oomycete pathogens in infected soybean stem/root tissues. Not only is this approach sensitive, accurate and cost-effective (estimated at less than $10 per sample), the time between sample collection and diagnoses can be as little as a few hours. The molecular infrastructure and expertise needed to run these assays are widely available in government and academia laboratories across Canada. Importantly, the tool can accurately detect the pathogens throughout the growing season, even prior to the development of disease symptoms. Overall, this diagnostic tool represents a substantial improvement over current methods to identify soybean diseases in Manitoba.

We thank the farmers that provided us access to their fields for sample collection. We are grateful to Manitoba Pulse & Soybean Growers, Western Grains Research Foundation and the Governments of Manitoba and Canada through the Canadian Agricultural Partnership for funding and supporting this project.

For further information please contact Bryan Cassone at cassoneb@brandonu.ca. ■

A field of healthy-looking soybeans

Photo Credit – Toban Dyck

Aphanomyces: We're Not a Fan

Laura Schmidt, Production Specialist – West, MPSG

'PEAS HATE WET FEET,' no argument there. One of the reasons saturated soils are so troubling for this crop is the devastating effects of Aphanomyces root rot. This root disease relies on soil moisture to reach pea roots and prefers warm soils.

Above ground, peas will be yellowing, stunted and necrotic. Below ground, roots will be unhealthy, decaying and nodules will be absent. You will see these symptoms popping up more commonly in June and July in the areas of the field that are accumulating water – along drains and water runs, in low spots and at field approaches and headlands where compaction has impacted drainage.

Thick-walled oospores, the resting spores of Aphanomyces that reside in the soil and on crop residues, are the challenge. They are extremely resilient and can lie dormant for more than 10 years in the soil. Right now, the only real solution we have is to draw oospore levels down in the field over time by taking an extended break between pea crops (six-year break minimum, but eight years preferred). This ensures that peas will remain profitable in that field.

Along with peas, other Aphanomyces hosts we want to avoid during that break period are lentils, dry beans, alfalfa, clovers, vetches, chickweeds and shepherd's purse. To take advantage of other nitrogen-fixing legume crops during this break period, soybeans, faba beans, lupins, sainfoin and birdsfoot trefoil are non-host/resistant legume options to work into the rotation.

	Dry Soil	Wet Soil
Cool Soil	• *Rhizoctonia solani*	• *Rhizoctonia solani* • *Pythium spp.*
Warm Soil	• *Fusarium spp.*	• *Aphanomyces euteiches* • *Fusarium spp.*

There is a root rot for every temperature and soil moisture. Aphanomyces root rot prefers warm, wet soils.

THE SITUATION IN MANITOBA

We now have disease prevalence results (the percent of pea fields infected with Aphanomyces) for Manitoba due to disease surveillance efforts by Dr. Yong Min Kim and his team at Agriculture and Agri-Food Canada in Brandon, in collaboration with Manitoba Agriculture, Manitoba Pulse & Soybean Growers and Dr. Syama Chatterton at AAFC-Lethbridge (Figure 1).

Something to be aware of with these results is that while Aphanomyces was detected in a startling amount of pea fields (virtually every field in 2022), the molecular method the lab uses to confirm this root rot in the soil is highly sensitive. So, a positive detection for Aphanomyces may not indicate that the disease occurred at great enough levels in the field to cause a yield impact on the crop. Dr. Kim and his lab are working on fine-tuning this assay to tease out the relationship between inoculum level and detection level.

The number of fields infected with Aphanomyces follows the trend of May to July accumulated rainfall. Years with

A field where, on the surface, peas are yellowing, stunted and necrotic, and their roots are unhealthy roots unhealthy, decaying and nodules will be absent.

Photo Credit – Laura Schmidt

A first-time pea field (left) next to a pea field with pea history and an Aphanomyces root rot infection, among other challenges (right).

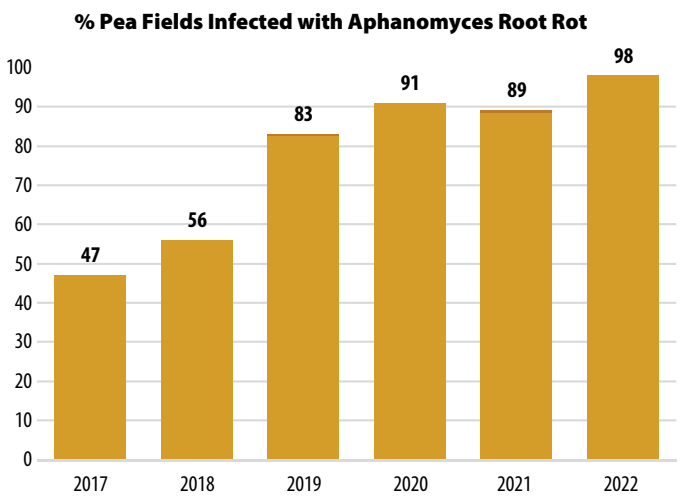


Figure 1. Prevalence (percent of fields infected) of Aphanomyces root rot in pea fields surveyed across Manitoba from 2017 to 2022.

the greatest amount of disease, 2020 and 2022, were also years with the most early summer moisture. It's important to keep note of those wet pea years since that will impact the disease load in a given field. A longer break between pea crops may be necessary if the previous peas were wet and had more root rot pressure.

Aphanomyces root rot is not new to Manitoba. It was first confirmed here in the 1970s. It is also not just a western Manitoba problem either. As pea acreage has expanded in Manitoba, survey efforts have extended to include central and eastern parts of the province. Aphanomyces is being detected in

continued on page 47

continued from page 45

REDUCING ROOT ROT RISK

Considerations	Higher Risk	Lower Risk
STEP 1: Major Influencing Factors		
Soil test for Aphanomyces	❑ Positive test result	❑ Negative test result
Environment the last time or times peas/lentils grown	❑ Above average moisture (wet)	❑ Below average moisture (dry)
Symptoms last time peas/ lentils grown	❑ Patchy to whole field affected; late season lodging	❑ No symptoms; healthy field
Action	If one or more checked above = **HIGH RISK. Do not seed peas or lentils into the field.** Choose a different field, wait until soil test is negative, or field out of peas/lentils for at least 8-10 years.	**Consider Intermediate Risk Factors.**
STEP 2: Intermediate Influencing Factors		
Field Conditions	❑ Heavy texture with poor drainage ❑ Field has compaction issues	❑ Lighter texture with good drainage ❑ No compaction issues
# of times peas/lentils grown in past 20 years	❑ > 5x or unknown	❑ < 5x
Last time in peas or lentils	❑ ≤ 4 years	❑ ≥ 8-10 years
Action	If majority of checks in this column then consider field as **Intermediate Risk** – consider Minor Influencing Factors before planting peas or lentils into this field.	If majority of checks in this column then consider field as **Lower Risk** – consider Minor Influencing Factors to help reduce potential infections and severity.
STEP 3: Minor Influencing Factors		
Rotation – crops included	❑ Limited diversity (canola or wheat)	❑ More diverse and include oat and/or mustard
Rotation – managing Fusarium	❑ High residue levels infected with Fusarium from previous crop (cereals)	❑ Low or no Fusarium infected stubble from previous crop
Weed control – presence or absence of susceptible weeds (alternative hosts)	❑ Weeds have been out of control on the field with high levels of host weeds	❑ Field is relatively weed free going into pea/lentils
Action	**Intermediate Risk** – Consider Management Decisions (Table 3) prior to seeding to address minor influencing factors where possible or plan to seed peas and lentils in a different field.	**Low Risk** – Field is low risk for Aphanomyces infection but no guarantee of no risk. Consider Management Decisions (Table 3).

Agronomic Factors	Recommendations for Lowering Risk
Seed quality	Choose seed that is good quality and disease-free. Consider using seed treatments to manage disease on seed and protect against early infection by Aphanomyces. asfd
Varieties	Choose varieties that have tannins in seedcoat and varieties with improved Fusarium resistance where possible.
Nutrient levels	Consider a balanced fertility plan to ensure nutrients are available and easily accessible.
Pea leaf weevil risk	Identify risk of pea lead weevil in the field/area and use insecticide seed treatment to reduce damage.
Soil management	Address any compaction in the field and do not move heavy equipment across the field if it is higher moisture (including rolling under wet conditions).

MANITOBA Pulse Soybean GROWERS

Aphanomyces Root Rot

DISTRIBUTION

- Common throughout Manitoba
- Risk greatest in warm, wet soils and in fields with more pea history and tighter crop rotations

SYMPTOMS

- Above-ground: crop yellowing and stunting
- Below-ground: if early, caramel, decaying lateral roots, if later, pinched taproots with poor root growth

SCOUTING

- Look for root rot symptoms from June to July
- If suspected, send roots or soil for lab testing!

MANAGEMENT

- Crop rotation break of 6 or 8 years between host crops (peas, alfalfa, dry beans, lentils, clovers and vetches)
  - If field conditions were wet the last time peas were grown, take a longer break
- Establish a strong pea crop (early seeding dates, good quality seed, balanced fertility, competitive varieties)

fields in those regions as well. It is quite troubling, because research has indicated that root rot severity is so much worse when Aphanomyces and Fusarium root rots occur together in the field – which they often do. We find Fusarium species infecting pea roots in every field we survey each year.

The first step to managing Aphanomyces root rot in peas is to confirm that it is present in your field. Plant root samples or soil samples (from the 4- to 8-inch depth) can be taken and submitted to diagnostic labs for testing. Soil samples are a great tool to use in the fall ahead of growing peas to determine if peas are a good choice for that field or if a longer break might be necessary before returning that field to peas.

To improve detection of this pest in the field, sample from low-lying areas like drains, water runs, low spots, approaches and headlands.

Saskatchewan Pulse Growers have a resource, Reducing Root Rot Risk (see image on left page), that contains a checklist to help decide when a field is suitable for a return to peas once Aphanomyces has been detected. It walks through major considerations like the environment and symptoms the last time peas were grown–are you starting with more disease carryover from the last pea crop? Then it considers the field conditions (drainage, soil texture) and field history like the number of pea crops and the time since the last crop. Other minor factors can have an impact as well like controlling host weeds and the risk of Fusarium root rots.

Establishing a strong start for peas will help your crop be more resilient to disease pressures too. Use good quality seed, balanced fertility, competitive varieties and seed early.

Watch the full Aphanomyces root rot webinar on MPSG's YouTube channel at www.youtube.com/@MbPulseGrowers. ■

PWCP – A Funding Opportunity for Prairie Farmers

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

Lynsay Perkins , Communications Coordinator, Manitoba Association of Watersheds

SEAN SMITH IS a third generation Manitoba farmer who started using beneficial management practices (BMPs) on his family farm hoping they would have a positive impact on their operations. So far, it's working.

"We have seen many benefits from BMPs," says Smith. "Lower input costs, better weather resiliency and we have seen our yields continue to improve."

Smith's farm has also been off synthetic fertilizers for five years, saving them money and reducing nutrient runoff.

When it comes to reducing reliance on synthetic fertilizers, legumes have a place in the spotlight. Their proven ability to fix nitrogen and reduce greenhouse gas emissions makes them a low-risk option for producers wanting to try something new. That's why legume crops play a role in several of the beneficial management practices funded through the Prairie Watershed Climate Program (PWCP).

PWCP, funded by Agriculture and Agri-Food Canada's Agriculture Climate Solutions – On-Farm Climate Action Fund (OFCAF), aims to help producers address climate change by implementing BMPs on their land. The program funds up to 85 percent of eligible activities with a cost-share approach, and is delivered by watershed districts across Manitoba.

The program is designed to increase implementation of select BMPs in three categories – rotational grazing, nitrogen management and cover cropping. For pulse and soybean growers with mixed livestock operations, all three categories may be relevant, but for grain farms, relevant practices will likely fall under nitrogen management and cover cropping activities.

Eligible nitrogen management activities include planning practices such as agronomic support for nitrogen management plan development, soil testing, and soil mapping. They also include certain changes to fertilizer application like upgrading to polymer-coated urea, use of a blend of nitrification and urease inhibitors as well as dual inhibitors, and equipment upgrades to improve fertilizer incorporation. Adding legumes to crop rotation, including cash crops, is also funded up to $35 an acre.

For cover cropping activities, PWCP provides funding for agronomic support for seeding cover crops, , seeds and seeding costs for fall-planted cover crops, intercropping and polycropping, as well as full-season or perennial cover crops. It's important to note that in this category, cover crops cannot be harvested with the intention of going to market (ie cash crops).

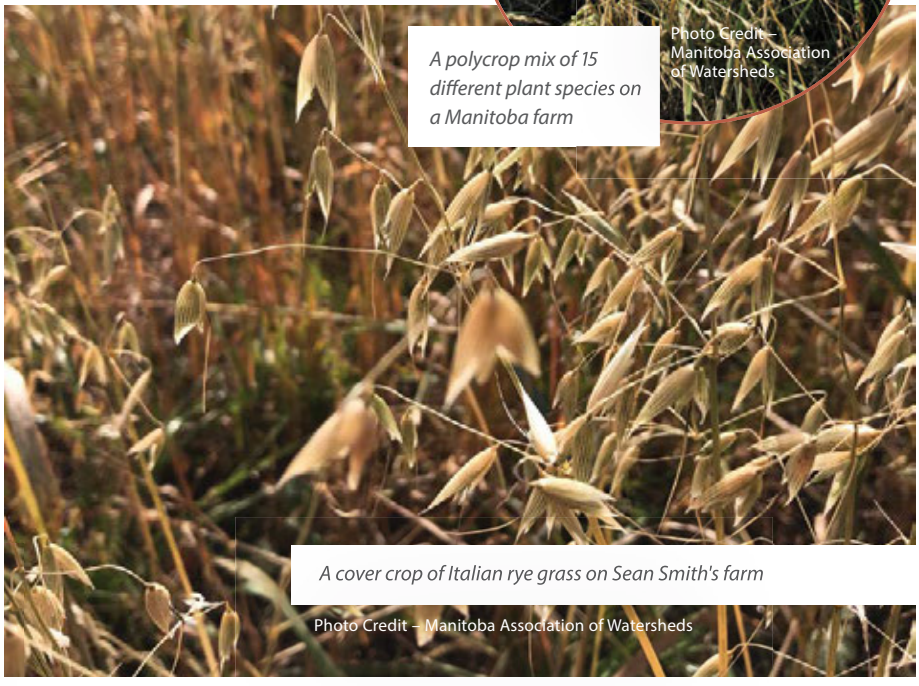
All BMPs offered through PWCP have a host of benefits to a producer's land, such as improved soil health, improved water

A polycrop mix of 15 different plant species on a Manitoba farm

Photo Credit – Manitoba Association of Watersheds

Legumes and grasses being used for cover cropping

Photo Credit – Manitoba Association of Watersheds



A cover crop of Italian rye grass on Sean Smith's farm

Photo Credit – Manitoba Association of Watersheds

Photo Credit – Manitoba Association of Watersheds

A late-autumn tour of Sean Smith's farm

infiltration, and reduced soil erosion, to name a few. They also provide benefits on the business end, such as increased crop yield, lowered nitrogen application rates, and potentially increased marketability of more sustainably-grown crops.

"I expect to see the greatest benefits to continue in our farm's ability to handle droughts and large rain events," says Sean Smith. "As we continue to increase our organic matter, we will be increasing both our water holding capacity and water infiltration rates."

In addition to the direct benefits to producers, implementing BMPs also has long-term benefits to the environment. Producers who adopt beneficial management practices like the ones funded through PWCP are part of a solution, both for addressing a changing climate as well as for ensuring that the long tradition of farming on the prairies continues to thrive.

Smith believes that implementing the types of activities funded through PWCP is integral to the future of farming in Manitoba. That's why he has also hosted farm tours to encourage others to try new beneficial management practices and to help other farmers see some of the ways they can be implemented.

"I am passionate about keeping rural communities strong," he says. "I feel that isn't possible without prosperous family farms who are involved in the community and can be passed on to the next generation."

Every farm is unique, so any practices a producer applies for under the Prairie Watersheds Climate Program must be recommended by a licensed agrology professional (with demonstrated competency in the agronomy practice area that may include a CCA designation). PWCP-funded projects must be new practices or be an expansion of a previous practice onto new acres.

Manitoba's watershed districts each have their own regionally-specific priorities, as determined by regional integrated watershed management plans, and governed by each district's local board of directors. Program availability and prioritization of eligible activities may vary from one district to another. The best resource for producers interested in PWCP is your local watershed district. Watershed district staff are available to walk you through the process and provide support along the way.

PWCP funding is open to any producer in Manitoba whose land is within a watershed district boundary. The program is also delivered in Saskatchewan through the Saskatchewan Association of Watersheds. Visit the Manitoba Association of Watershed's website at manitobawatersheds.org to access a map of watershed districts in Manitoba or to learn more about the Prairie Watershed Climate Program. ■

Funding for this project has been provided by Agriculture and Agri-Food Canada through the Agricultural Climate Solutions – On-Farm Climate Action Fund.

Ce projet est financé par le ministère de l'Agriculture et Agroalimentaire Canada sous le programme Solutions agricoles pour le climat (SAC) – Fonds d'action à la ferme pour le climat (FAFC).

Sustainable Canadian Soy Program Launches with 2023 Crop

Jeanine Moyer, Owner, Barn Door Communications

STEWARDSHIP AND SUSTAINABILITY have long been fundamentals of Canadian farms, especially when it comes to soybean production. But as market continues to evolve, the industry is taking the next step to keep the pace with the competition and maintain market access through a new Sustainable Canadian Soy program.

Launching in March 2023, the Sustainable Canadian Soy program is the result of extensive industry consultations and collaboration that will meet customer needs for verified sustainable soybeans.

"This program is important for all Canadian soybean growers," says Brian Innes, executive director with Soy Canada. "It's an important step forward in delivering what governments and customers are asking for."

The Sustainable Canadian Soy program is a voluntary market-driven whole-farm program that will enable the Canadian soybean industry to compete with international competitors, like the United States and South America.

WHY CANADA NEEDS A SOY SUSTAINABILITY PROGRAM

"A verifiable sustainability program is the cost of admission for some international soybean markets," explains Innes. "Our competitors are already sharing their ability to produce soybeans sustainably, and in the absence of our own verifiable program, our customers are left to make assumptions. We need to show we're following sustainable production practices."

Customers for food grade and Identity Preserved (IP) soybeans in the European Union and Japan are currently driving the need for a verified supply of sustainably produced soybeans. The first segments of the value chain to implement the program will be growers, grain handlers, and exporters of food grade and IP soybeans.

And while the program may not be needed for every Canadian soybean grower today, new regulations in the EU requiring proof that soybeans shipped to the EU are not grown on deforested land, starting with the 2024 crop, could increase the need for verified sustainable soy.

"It's not clear yet what we'll need to do to continue shipping to the EU, but it's a sign of the growing need to document our sustainable production practices here in Canada to meet the requirements of our customers and their governments," says Ernie Sirski, Soy Canada board member. "As farmers we're using sustainable production practices and will continue to do so in the future – but our future also depends on continued market access."

INDUSTRY CONSULTATION

The need to verify production practices isn't a new concept. Conversations about the need to develop a Canadian soy sustainability program started a few years ago. Led by Soy Canada, extensive industry consultations to develop such a program began in earnest in 2021 with board discussions, member meetings, and one-on-one conversations. Throughout the process, the entire Canadian soybean value chain was consulted, including grower associations and other industry organizations like Pulse Canada. In addition, focused consultations were conducted with 25 different organizations that included members and non-member grain handlers and processors.

Manitoba Pulse & Soybean Growers (MPSG) was instrumental in the development of the Sustainable Canadian Soy program, bringing growers' voices to the table to shape the program.

"We're seeing sustainability demands coming at growers from multiple directions," says Daryl Domitruk, MPSG executive director. "We see the Soy Canada program as an opportunity to meet market needs and to define sustainability on our own terms, starting at the farm and throughout every link of the soy value chain."

FARM SUSTAINABILITY ASSESSMENT

Various program options were evaluated before Soy Canada made the decision to implement a verified sustainable Farm Sustainability Assessment (FSA) system in mid-2022. Innes explains the group reviewed existing options including the Canadian Roundtable on Sustainable Crops Code of Practice and the International Sustainability and Carbon Certification program used for EU biofuels. They even considered creating their own Canadian soy program. The final decision to offer the globally recognized FSA aligns with Sustainable Canadian Soy priorities and recognizes Canadian federal and provincial legislation.

Innes explains that, while there's a need to develop a sustainability program to meet soy market needs today, every step of the program development process considered that Canadian farmers and exporters handle multiple crops. "We've been guided by implementing a program that meets our customer needs, but also reflects that our farmers grow soybeans as part of a sustainable rotation. It's important that we work together as an industry to implement a system that is streamlined and involves collaboration wherever it can bring value," says Innes.

HOW IT WORKS

The Sustainable Canadian Soy program is a voluntary program for any grower, grain handler, and exporter interested in meeting this market need. The Sustainable Agriculture Initiative Platform developed the FSA as a harmonized and flexible sustainable sourcing model for buyers to understand the sustainability performance of their supply chains based on farm-level data.

FSA powers the new Canadian program, providing a whole farm sustainability assessment that incorporates economic and financial viability, social responsibility, and environmental protection. For Canadian soy customers, the FSA will provide access to a third-party verified

sustainable supply backed by a globally recognized system.

"It's a system that will demonstrate how Sustainable Canadian Soy is comparable or better than other origins," explains Domitruk. "This assurance process also enables users of Canadian soybeans to make sustainability claims with confidence, including food packaging."

FSA also has benchmarks equivalent to many international programs, including the Soy Sustainability Assurance Protocol (SSAP) in the United States. SSAP is equivalent to FSA silver, a benchmarking level Soy Canada anticipates Canadian growers will achieve through the new program.

Starting with the 2023 soybean crop, exporters or grain handlers will begin contacting growers who may be interested in participating in the program. Participation requires completing a questionnaire that looks at all aspects of the sustainability of a farm operation. A small number of growers will also be required to participate in an assessment by a third party each year, a process that is managed by their exporter or grain handler.

"The Sustainable Canadian Soy program will drive value for the soybean industry," says Innes. "This program is designed to minimize the additional documentation workload while maintaining access to markets that recognize the quality of Canadian soybeans, open new opportunities, and ultimately, get the most that we can for our soybeans."

To learn more about the Sustainable Canadian Soy program, visit soycanada.ca/sustainability ■

SOYBEAN SCOUT ANSWERS

Sunburn in Soybeans

A

B

A – Cercospora leaf blight symptoms start to occur during the seed formation stages of soybeans. This disease rarely causes yield loss.

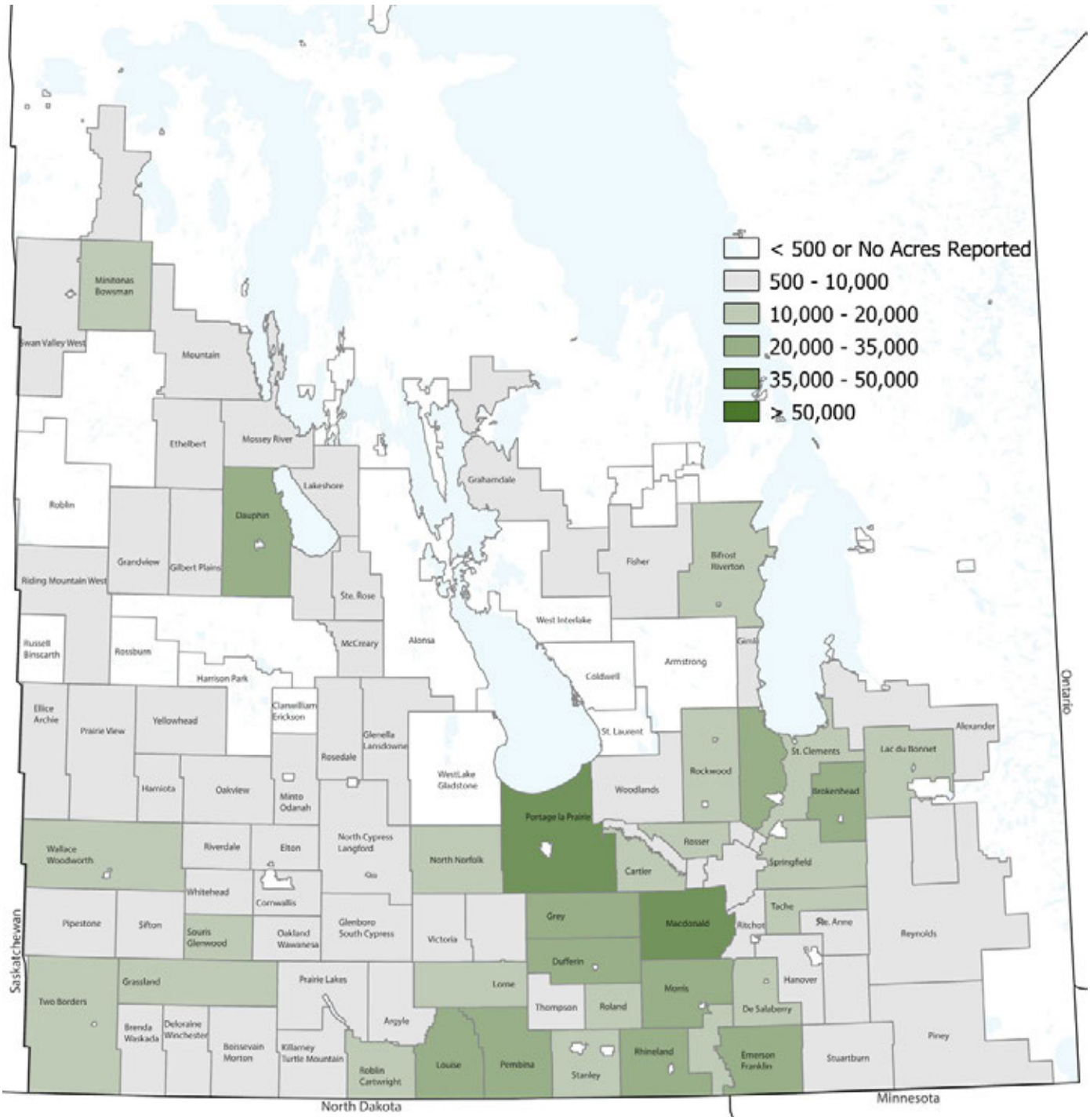
Lesions extend over the entire upper leaf surface giving them a leathery, dark purple appearance highlighted with bronze. Lesions may or may not extend to the leaf underside. Warm, wet weather favours disease development. Symptoms are commonly confused with sunburn, which occurs on the leaf underside.

B – Alternaria leaf spot generally infects leaves and pods of soybean plants that are approaching maturity. Since it occurs late in the growing season, yield losses are minimal.

Lesions start as small round spots and are restricted by leaf veins. As lesions expand and combine, larger necrotic areas occur on the leaves. Infected leaves dry out and drop prematurely.

Alternaria leaf spot is usually a secondary infection following mechanical injury, insect damage or other diseases. Symptoms typically appear following periods of dry, warm weather.

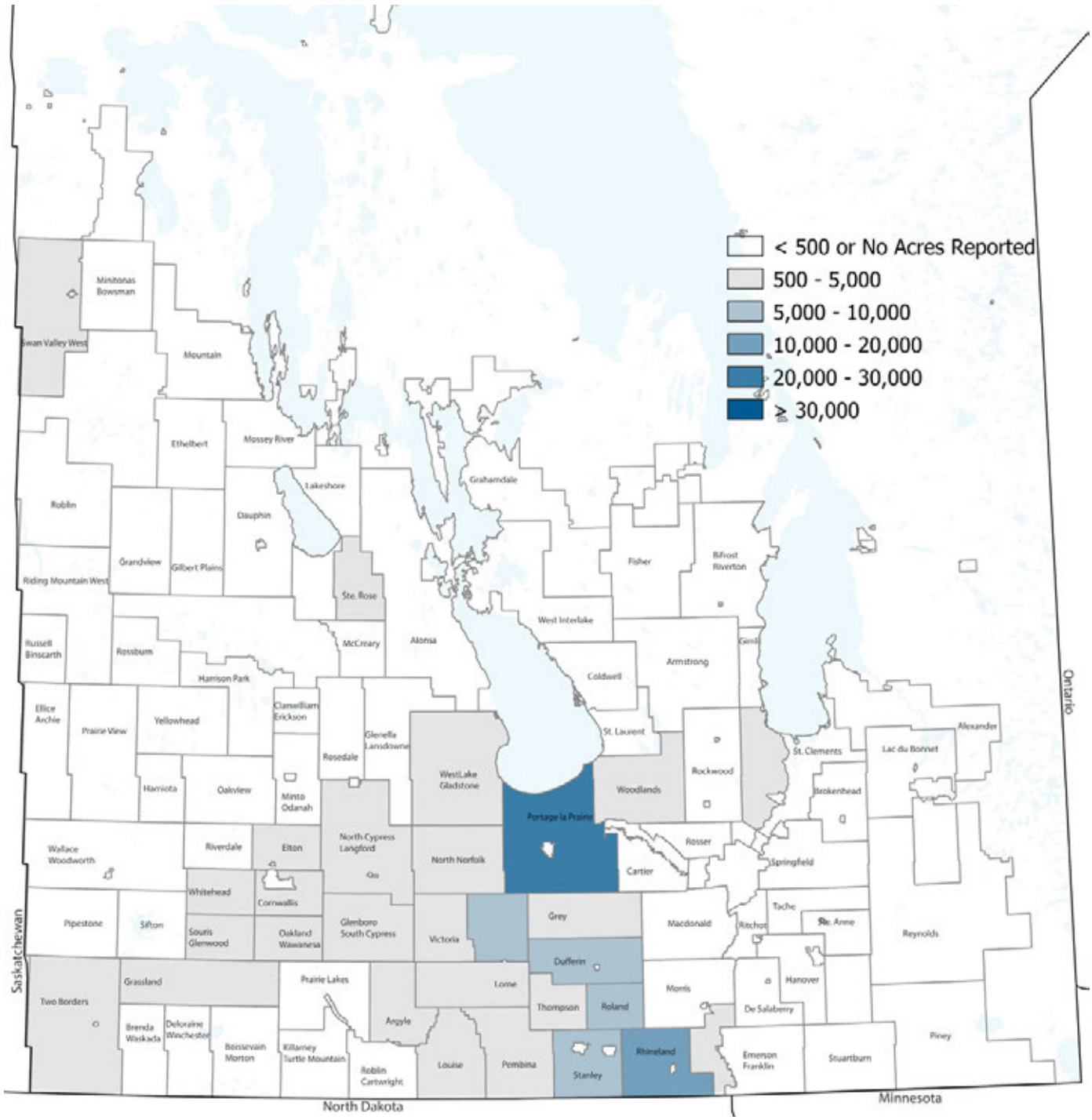
2022 Soybean Acres



MANITOBA Pulse Soybean GROWERS

MASC Manitoba Agricultural Services Corporation

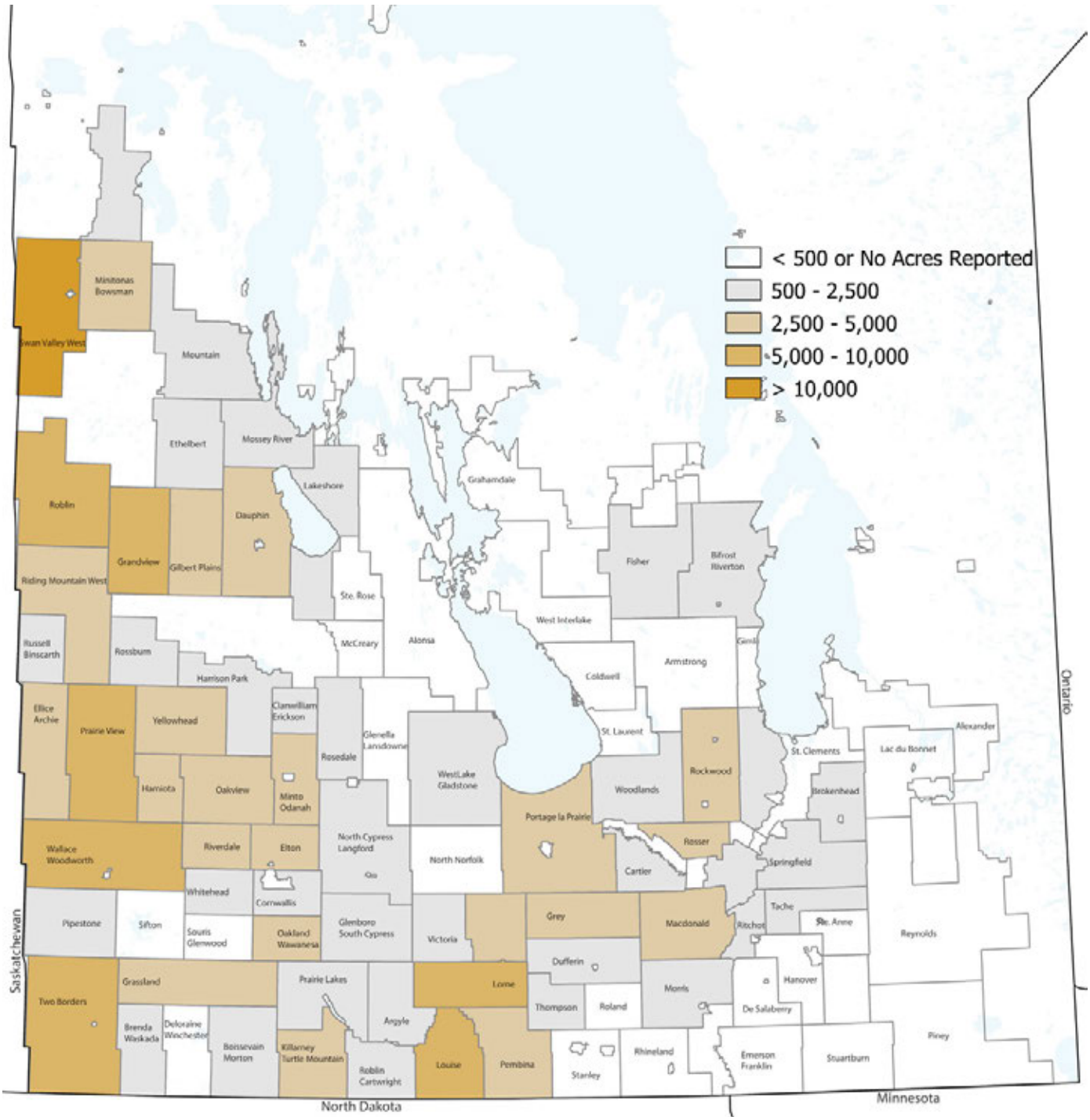
2022 Dry Bean Acres



MANITOBA Pulse Soybean GROWERS

MASC Manitoba Agricultural Services Corporation

2022 Pea Acres



MANITOBA Pulse Soybean GROWERS

MASC Manitoba Agricultural Services Corporation

Manitoba Pulse & Soybean Buyer List–February 2023

COMPANY	EDIBLE BEANS	FABA BEANS	LENTILS	PEAS	SOYBEANS	PHONE	LOCATION	CGC REGULATED
Adroit Overseas Enterprises Ltd.	√	√	√	√	√	604-930-4855	Surrey, BC	√
Agassiz Global Trading	√			√	√	204-745-6655	Homewood, MB	
Alliance Pulse Processors Inc. dba AGT Foods Canada	√	√	√	√	√	306-525-4490	Regina, SK	√
All Commodities (AC) Trading Ltd.			√	√		204-339-8001	Winnipeg, MB	√
Avena Foods Ltd. dba Best Cooking Pulses Inc.			√	√		306-586-7111	Rowatt, SK	√
Bayer - Crop Science Monsanto Company					√	314-694-5764	St. Louis, MO	
Belle Pulses Ltd.		√		√		306-423-5202	Bellevue, SK	√
Besco Grain Ltd.		√		√		204-745-3662	Carman, MB	√
Brett-Young Seeds Ltd.				√	√	204-478-2204	Winnipeg, MB	
Broadgrain Commodities Inc.	√	√	√	√	√	416-504-0070	Toronto, ON	√
C.B. Constantini Ltd.	√	√	√	√		604-669-1212	Vancouver, BC	√
Cargill Ltd.					√	204-947-0141	Winnipeg, MB	√
Columbia Grain Inc. (CGI) (Walhalla Bean Co.)	√					701-549-3721	Walhalla, ND	√
Delmar Commodities Ltd.	√		√	√	√	204-331-3696	Winkler, MB	√
ETG Commodities	√	√	√	√	√	416-900-4148	Mississauga, ON	√
G3 Canada Limited				√	√	204-983-0239	Winnipeg, MB	√
Gavilon Grain LLC					√	816-584-2210	Omaha, NE	√
Global Food and Ingredients Inc.	√	√	√	√		416-840-8590	Toronto, ON	√
Hensall District Co-operative Inc.	√			√		204-750-0529	Winnipeg, MB	√
Horizon Agro Inc.					√	204-746-2026	Morris, MB	√
Kalshea Commodities Inc.			√		√	204-488-0251	Winnipeg, MB	√
Knight Seeds			√		√	204-764-2450	Hamiota, MB	
Linear Grain Inc.	√	√		√	√	204-745-6747	Carman, MB	√
Lyft Commodity Trading Ltd.	√	√	√	√	√	604-355-4275	Vancouver, BC	√
McDougall Acres Ltd.	√	√	√	√	√	306-693-3649	Moose Jaw, SK	
Merit Functional Foods Corporation				√		204-223-7020	Winnipeg, MB	√
Natural Proteins Inc.					√	204-355-5040	Blumenort, MB	
Nutri-Pea				√		204-239-5998 x 108	Portage la Prairie, MB	
NuVision Commodities Inc.	√			√	√	204-758-3401	St. Jean Baptiste, MB	
Parrish & Heimbecker Ltd.				√	√	204-987-4329	Winnipeg, MB	√
Paterson Grain	√			√	√	204-956-2090	Winnipeg, MB	√
Prairie Fava Ltd.			√			204-721-4715	Glenboro, MB	√
Prairie Flax Products Inc.				√		204-252-2940	Portage la Prairie, MB	
Providence Grain Group			√	√	√	780-997-0211	Fort Saskatchewan, AB	√
PS International, LLC dba Seaboard Special Crops		√	√	√		306-565-3934	Regina, SK	√
Richardson International Ltd.			√	√		204-934-5652	Winnipeg, MB	√
• Richardson Pioneer Limited				√	√	204-934-5627	Winnipeg, MB	√
• Tri Lake Agri Limited				√	√	204-934-5652	Winnipeg, MB	√
Roquette Canada Ltd.				√		204-428-3722	Portage la Prairie, MB	√
Rudy Agro Ltd.	√		√	√		306-867-8667	Outlook, SK	√
Scoular Canada Ltd.	√	√	√	√		403-349-5077	Calgary, AB	√
Seed-Ex Inc.				√	√	204-737-2000	Letellier, MB	√
Semences Prograin Inc.					√	450-469-5744	Saint-Césaire, QC	√
Shafer Commodities Inc.	√	√	√	√	√	204-822-6275	Morden, MB	√
Simpson Seeds Inc.			√	√		306-693-2132	Moose Jaw, SK	√
Southland Pulse Inc.			√	√		306-634-8008	Estevan, SK	√
Sunrise Foods International Inc.					√	306-657-4541	Saskatoon, SK	√
The Andersons Inc.			√	√		419-891-6464	Maumee, OH	√
Vandaele Seeds Ltd.		√		√		204-665-2384	Medora, MB	√
Vanderveen Commodity Services Ltd.				√	√	204-745-6444	Carman, MB	√
Viterra Inc.	√		√	√	√	Contact your local Viterra Sales Rep		√
Western Harvest Bean ULC	√					204-515-7331	Winnipeg, MB	
Wilbur Ellis Company of Canada Ltd.	√	√	√	√		403-328-3311	Lethbridge County, AB	√
XPT Grain Inc.	√			√		306-525-0205	Regina, SK	√

The Canada Grain Act requires some elevators and grain dealers to have a Canadian Grain Commission (CGC) license and post security to cover their liabilities (what they owe) to farmers. Grain dealers and operators of primary, terminal, and process elevators in western Canada are licensed by the CGC. Seed cleaning plants, which do not purchase grain, and feed mills do not have to be licensed.

It is the responsibility of farmers to satisfy themselves that any company they deal with is financially sound. Questions regarding licencing and security should be directed to the CGC at 800-853-6705 or 204-983-2770.

MPSG's pulse crop buyers list contains the names of companies that have registered with MPSG and are actively purchasing pulse crops in Manitoba. The word registered does not imply endorsement. The complete list is available on our website manitobapulse.ca.

Recipe Corner

Roasted White Beans

COURTESY OF MPSG

SERVINGS: 10–12
PREP TIME: 30 min
COOK TIME: 45 min
TOTAL TIME: 1 hour, 15 min

INGREDIENTS

- 1 ¼ cup dry white beans (about 2 ½ cups cooked white beans), or 1 19oz-can white cannellini beans, drained and rinsed
- ½ cup canola oil
- 1 red bell pepper, chopped in small pieces
- 1 green bell pepper, chopped in small pieces
- 1 medium onion, very finely chopped
- 3–4 garlic cloves, minced
- 6–8 cherry tomatoes, halved
- 1 tbsp dried oregano
- 1 tsp tomato paste, diluted with ¼ cup of water
- ¼ tsp ground black pepper
- ¼ tsp salt

METHOD

[Soak beans overnight.

Rinse and simmer beans for about 30 minutes until soft but not mushy, drain and set aside.]

Preheat oven to 350 F (180 C).

Chop vegetables and in a large bowl combine the peppers, grated onion, garlic, beans, canola oil, tomato paste-water mixture, oregano, salt and pepper. Mix gently as to not break the beans.

Add the halved cherry tomatoes and mix in gently.

Pour into casserole dish.

Cover with aluminum foil and roast for about 45 min until peppers are soft. (Reduce this time to 30–35 minutes if using canned beans.)

Remove foil and roast for about 10 minutes if you want some browning. Be careful not to leave it uncovered too long, otherwise the beans will dry out.

Remove from oven.

Serve as side dish.

BlackHawk CONQUER II GoldWing ThunderHawk

THE UNSTOPPABLE SUPERPOWER OF PRE-SEED.™

Start clean and eliminate weed competition with the power of the Nufarm pre-seed burndown portfolio in canola, cereals, pulses and soybeans. Built with the farmer in mind to offer performance, convenience and resistance management in a single package.

Amplify your glyphosate pre-seed burndown with BlackHawk®, CONQUER® II, GoldWing® and ThunderHawk™. It's pre-seed power without the complexity.

1.800.868.5444 | Nufarm.ca | NufarmCA

Nufarm
Grow a better tomorrow

There's a battle going on down here you won't see in pulse crops. Until it's too late.

Introducing **Zeltera® Pulse** seed treatment featuring four unique active ingredients for robust, broad-spectrum control of seed- and soil-borne diseases. It has two unique modes of action targeting every labeled class of pulse disease to manage resistance — including built-in Aphanomyces and fusarium root rot protection. New easy-to-apply Zeltera Pulse. Only from Nufarm.

NUFARMER NATION
SAVE UP TO 12%

Zeltera® Pulse

1.800.868.5444 | nufarm.ca | NufarmCA

Always read and follow label directions.
Zeltera® is a registered trademark of Sumitomo Chemical Co., Ltd.
85685-1022

Nufarm
Grow a better tomorrow