MANITOBA PULSE & SOYBEAN GROWERS

pulsebeat

Issue 86 • Spring 2019

Focus on Research

The Bean Report

What Can We Expect from Soybeans After a Dry Year or Two?

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RISK ASSESSMENT OF WIREWORMS IN MANITOBA FIELDS

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Survey of Soybean, Field Pea and Dry Bean Root Rots in Manitoba

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Design and Production	Imprint Media Services Inc.

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

Publications Mail Agreement #40016070

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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.

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

In This Issue

Cover photo by Toban Dyck, MPSG

Highlights Annual General Meeting 2019

MANITOBA PULSE & SOYBEAN GROWERS (MPSG) said goodbye to longstanding director Rick Vaags, who retired from the board at the association's Annual General Meeting (AGM) held on Feb. 13 during the CropConnect Conference. Be sure to read about Rick's time as an MPSG director on page 13 of this issue of *Pulse Beat*.

During the AGM, which brought in about 100 people, MPSG had the privilege of welcoming a new director to its board. Garrett Sawatzky farms with his wife and parents near Altona, Manitoba.

Board members John Preun and Calvin Penner, whose terms were up, let their names stand for re-election. They were both elected by acclamation.

Hon. Ralph Eichler, Minister of Agriculture, Province of Manitoba

MPSG had the honour of hosting the Honourable Ralph Eichler, Minister of Agriculture. He brought greetings from the province and spoke about how important events like CropConnect are to the sector. Eichler also mentioned MPSG's commitment to working collaboratively with other commodity groups.

Board member Hailey Jefferies then gave the nominating committee report and confirmed the current directors.

Following that, Alex George of George & Associates Chartered Professional Accountants Inc., presented MPSG's audited 2018 financial statement.

John Preun thanks Rick Vaags for his eight-year contribution to the board of MPSG.

Director of Finance and Administration Melissa Denys-Roulette walked attendees through the Scientific Research and Experimental Development (SR&ED) program and explained how farmers who contribute check-off dollars to MPSG, and are in good standing, are eligible to claim a federal tax credit through it.

"It is because of you, our farmers, our board of directors and a top-notch staff that MPSG continues to be a fantastic, research and farmer-focused association," wrote François Labelle in his executive director's report.

Daryl Domitruk, director of research and production, reported on what the association will be focusing on in 2019.

"In 2018 MPSG continued to solve production challenges and uncover opportunities for pulse and soybean producers through investment in two areas: research and production extension," he wrote. "These combined investments represent MPSG's largest contribution to building and improving the business of pulse and soybean production in Manitoba."

Following the resolutions report and a presentation thanking Rick Vaags for his eight years of service to the board, the floor was opened for general discussion.

"Thank you very much," said John, following adjournment. "Have a great CropConnect and be safe out there when you're farming this year."

2018 MPSG Financial Reports are available online at manitobapulse.ca

Manitoba Pulse & Soybean Growers 2019 Committees and Representatives

MPSG COMMITTEES – *The first named is chair*

Executive – C. Penner, M. Rattai, E. Sirski, F. Labelle

Governance/HR – F. Prince, B. MacMillan, F. Labelle

Policy– H. Jefferies, B. Phillips, F. Prince (alt), F. Labelle, T. Dyck

Finance/Audit – M. Rattai, J. Preun, F. Labelle, M. Denys-Roulette

Resolutions and Nominating – H. Jefferies, G. Sawatzky, C. Penner

Communications/Member Relations/Market Development – E. Sirski, H. Jefferies, B. MacMillan, F. Labelle, B. Phillips, T. Dyck, S. Robinson, L. Schmidt, D. Domitruk

Research – F. Prince, B. Martens, M. Rattai, B. Phillips, J. Preun, G. Sawatzky, D. Domitruk, F. Labelle, S. Robinson, L. Schmidt, C. Tkachuk, W. Voogt, I. Kirby, industry advisors

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

MPSG REPRESENTATIVES

Canadian Grain Commission Pulse Sub-Committee – F. Labelle, D. Domitruk (alt)

Grain Growers of Canada – B. Phillips, B. MacMillan (alt)

Keystone Agricultural Producers
- **General Council** – F. Labelle
- **Pulse/Oilseed Sub-Committee** – M. Rattai, F. Labelle (alt)
- **Commodity Group** – C. Penner, M. Rattai

MCVET – D. Domitruk, D. Lange

PGDC/PRCPSC – B. Martens, H. Jefferies, D. Domitruk, D. Lange

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

Soy Canada – E. Sirski, M. Rattai

Western Canadian Pulse Growers Association
- **WGRF** – C. Loessin (SPG)
- **CGC Western Grain Standards Committee** – E. Sirski (exp. 2021)

Message from Board Chair

John Preun, Chair

THE 2019 GROWING season is about to start. Spring is an exciting time of year, though this winter's meeting season was fantastic. CropConnect once again proved to be an excellent opportunity to network with other farmers and learn. I feel equipped with lots of good information I can put to work on my farm. I would like to extend a heartfelt thanks to all the hard working people who make CropConnect and the many other winter meetings possible.

I'm looking to the 2019 growing season with a cautious optimism. U.S. President Donald Trump has made it hard to foresee what the next few months will be like for farmers. The markets hang in the balance of one off-colour tweet. We've seen this happen again and again.

Input costs are rising and we have looming and relatively unknown threats such as a carbon tax and decreasing commodity prices. These things have the ability to make profit markets shrink.

I know that on our farm, we are paying close attention to the details. It's what farming may look like over the next few years – protecting tight profit margins. At least, that's the way things are looking now.

I urge Manitoba pulse and soybean farmers to be mindful of their input costs and do their best to lower that break-even yield as much as possible. It's one of the tools we have for protecting our farming operations against high costs and an unpredictable marketplace.

Manitoba Pulse & Soybean Growers (MPSG) continues to work hard at ensuring its members have access to the most up-to-date and relevant research. It's an honour to be a part of this organization and work with such a fantastic board of directors and staff.

Being a part of the high-level research conversations continually fills me with optimism for Manitoba's pulse and soybean industry. MPSG is asking the tough questions and has a great perspective on supplying its farmer members with production tools that they can use on their operations today, as well as looking to the future to anticipate what may be concerns two, three, four years from now.

The agricultural industry has been increasingly scrutinized over its use of pesticides and herbicides. Following the loss of certain neonics, this topic has come up often around the board table. It's something MPSG is monitoring very closely. It's important farmers have the tools available to them in order to grow the best crops possible.

MPSG is unable to foresee all the challenges that loom around the corner. It's impossible to predict the future (if only we could).

I'm confident, though, in the association's ability to tackle whatever comes with the best interests of us farmers in mind. They have proven this time and time again.

I'm continually impressed with the MPSG staff team's commitment to quality and its members.

I speak for a lot of farmers when I say we're looking forward to hearing more from our friends, Roquette. A lot of farmers are doing well with peas and there is a lot of potential for acres to grow, once Roquette starts offering contracts. We're looking forward to it.

Spring is around the corner and that means seeding will start soon for many of us. I wish you all a great growing season and I'd like to urge you to be in touch with MPSG. They love to hear from farmers on everything from updates on what's going on in certain areas of the province to ideas for research to advice on how they can better serve their members.

Have fun and stay safe out there. Also, don't forget to spend time with the ones you love. That's what matters most.

– John ■

Soybean Scout

Which seedling symptom is influenced by seed quality?

Answers can be found on page 44

Photo: Dennis Lange, Manitoba Agriculture

A

B

Message from Executive Director

François Labelle, Executive Director

WINTER USED TO be a time for curling but now it is time for evaluation and planning. What worked in the growing season? What did not? What should be done this year and in subsequent years?

From discussion with Manitoba farmers and industry people, this year will be quite different, as there are not nearly as many factors working in favour of growers.

After going through several years of a fairly good cycle where the stars aligned on production, markets were good and most, if not all, crops were winners. With the world's supply of some commodities seemingly full, and all the disruptive forces at play, we are noticing a shift. There are lots of questions as to what farmers will seed this spring. It'll be interesting to see what happens with soybean and pulse acres.

With margins as tight as they are on most crops, the decision of what to grow is not being made easily. Farmers want to have the flexibility to make changes, and that makes a lot of the industry – from input supplier to buyers – nervous.

The uncertainty surrounding seeding intentions and possible changes in prices and market access is something Manitoba Pulse & Soybean Growers (MPSG) is monitoring closely. Most commodity groups are doing the same. There have been some discussions this winter surrounding some groups needing to take corrective action after experiencing a drop in revenue. MPSG members, rest assured, through the good financial stewardship of present and past board of directors, all of our research commitments are fully funded into the future, and there are reserves if needed. The association is in good shape, financially.

ANNIVERSARY

2019 is the 35th anniversary of our association. You will be hearing more about this during the year, but I will say that since I have been around for the full 35 years, we sure have seen lots of changes in crop production and the association as a whole. Over the years, MPSG has had a real positive influence on the pulse and soybean crops grown in Manitoba. I expect that we will continue to be the dynamic and responsive leaders our farmers can depend on.

MARKET DISRUPTIONS

We can easily say, "Let's go back to when the markets were good and the prices were high." Unfortunately, there are some who believe that with a "trade deal" all will be good and we will go back to the way it was. Making a quick deal will not turn the clock back.

When an ongoing deal or relationship breaks down, the first thing that is destroyed is trust. I dare say trust has been collateral damage in a lot of trade deals around the world, and trust is the hardest thing to regain. It can take years, even decades – add to the mix cultural differences, personalities and the fact that in the meantime new trade relationships can be forged with more "trustworthy" partners.

We may never see the world markets as they were, but we will need to find a new normal.

WEATHER AND CLIMATE

We've had two years of dry conditions. Does this mean we are due for a fairly long-term cycle of wetter than normal weather? What will this year deliver us? With a 10, 15 or 25 percent increase in

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precipitation over some of the past years, lots of our crops were able to thrive and we saw great yields. In the last two years, the opposite happened and we saw some really disappointing yields. Temperatures were also a factor.

As an industry, are we ready and resilient enough to survive more years like this? If not, what do we need to do to prepare?

What about our changing climate? Yes, Manitoba is being called the new Iowa, weather wise. Will we actually see the increases in yields? Should we be focusing on just this gain, how about the wild swings in weather? We have not really experienced this yet as other areas have. Recently, Australia reported plus 48°C temperatures with hurricane force winds. Can our buildings or crops survive this? We already know of floods and droughts happening in the same year and it's devastating. We need to make certain we are part of the discussions to mitigate these effects and also make certain we are prepared for this, if at all possible.

A bright spot – if we want to have a positive effect on climate change, growing pulse or annual nitrogen-fixing crops will help lower our farm greenhouse gases (GHG) footprint. We are part of the solution, but we will need to do more.

ON-FARM RESEARCH

It's exciting to see the growing interest in this program. There are always questions that small-plot research trials are not real. They are not like my farm, some say. But with on-farm research, which is actually done on your farm or another in your area, with regular farm equipment, it's a great tool used on an actual Manitoba operation. It allows you, the farmer, to see if a product recommendation really works for you, so you can make an unbiased decision as to whether or not to spend your money on a specific input.

One of the results from the On-Farm Network program is that it gets more people to understand what research is really about, the importance of replication in a proper trial as well as what it means to do statistical analysis. I hated stats when I was at university, but I was always good with numbers. Proper analysis is important. Without it, these on-farm tests are merely a demonstration.

We see lots of demonstrations and we have lots of discussions about them. "I treated part of my field and it was greener, so it worked." Well a demonstration may have showed a difference but will it make a real difference to your bottom line?

The On-Farm Network program is available to help you answer the questions – inoculant vs no inoculant; fungicide vs no fungicide, etc. We are not selling you a product. We want to equip you with the tools to decide for yourself if something is of value to your farm. If you are interested in results, they are on our website, but if you want to participate in the on-farm trials, call the office and speak to our team.

PEAS

A lot of Manitoba farmers are talking about peas and some are already growing them, which is good. We do want to caution people to do their homework on marketing. The Roquette plant is being built in Portage la Prairie and we expect construction to really ramp up soon, but it's still close to a year

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away before they will be buying peas. There used to be a lot of pea buyers in Manitoba. Now, not so much.

Roquette will have specific requirements for their suppliers, so be sure to talk to them about what they want so you are not surprised or turned down at delivery. Once they get up and running, we expect this will be a great opportunity for our farmers.

PESTICIDES

This continues to be a hot topic. Lately, in most industry meetings, there have been discussions about pesticides, product usage, registration, residue, and consumer influence.

Not that long ago, if the topic of pesticides was brought up, the comments would have been, "Well, crops are produced with these products. They are safe, science says so. If the consumer is not happy, let him or her go hungry." No one went hungry for this reason, but through influence, in media, from food companies and other segments of the industry – now there is more and more discussion about products, their use and if there are residues on food.

As farmers and farmer groups, what can we do about this? USE PRODUCTS RESPONSIBLY. Use products when they are needed and be sure to follow the labels properly. We read and had the opportunity to edit a document stating that farmers were indiscriminate users of pesticides. We had that comment changed, but the document also said – and we thought this was true – that ultimately the decisions surrounding the use of pesticides are in the farmers' hands. Farmers should bear some responsibility for the proper use of products – from deciding if it is needed to proper applications. The whole value chain has this responsibility and should be held accountable.

STAFF

Staff are developing their work plans for this summer – from research projects, On-Farm Network trials, scouting activities and production information. A lot of time and effort goes into this. Staff is busy. Extension and communications are hard at work planning the year. And it's going to be another full year of exciting research proposals and developments that we as your association can hardly wait to tell you about. Stay tuned.

We're excited about 2019 and we hope you are, too. Stay safe out there and have a great growing season!

– François ■

DATES TO REMEMBER 2019

Crop Diagnostic School
July 9–12 | July 16–18
Carman, MB

SMART Day July 23
Carman, MB

Crops-a-Palooza July 24
Carberry, MB

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Canada

Greetings at the Start of Another Federal Election Year!

Jeff Nielsen, Chair of Grain Growers of Canada

GRAIN GROWERS OF Canada (GGC) began 2019 on a strong note, welcoming Erin Gowriluk as our new executive director. Erin has a diverse background in agriculture, having worked with Syngenta Canada, the Alberta Wheat and Barley Commissions and the Alberta Ministry for Agriculture and Rural Development. She will be busy implementing the new strategic framework we developed through our year-long strategic review launched in January 2018.

As Canadian grain farmers' Ottawa-based advocacy organization, GGC represents 65,000 grain farmers through our 16 national, provincial and regional grower group members. We act as your eyes and ears on policy matters while creating engagement opportunities with the federal government. GGC provides its members with a valuable forum for policy development and a strong voice in the nation's capital. Policy makers know that GGC provides an informed and diverse viewpoint and we welcome every opportunity to include the perspective of Manitoba growers to meetings, submissions and events.

As such, GGC is gearing up for election 2019 focussed advocacy. While the election is still eight months away, parties are actively working on platform development and GGC will continue to engage with all federal parties.

Agriculture and agri-food has a lot to build on when it comes to lobbying and election outreach this year. Reports like the one prepared by the Economic Strategy Table for Agri-Food and the recent infrastructure commitments in the 2018 Fall Economic Statement are good news for our industry and provide us with benchmarks against which to measure the government's performance. Never before has Canada's agricultural sector seen this kind of attention. The opportunity is ours to seize.

As a refresher, the Economic Strategy Tables were established in response to the ambitious targets set out in Budget 2017. They brought together industry experts to develop recommendations, in consultation with stakeholders, on to how to realize their sectors' full potential with the aim to grow the Canadian economy. Chaired by Murad Al-Katib, CEO of AGT Foods, the Agri-Food Table identified several sector-specific opportunities including growing trade to $85 billion by 2025[1]. The report also outlined clear barriers to growth including regulatory burdens that hinder innovation, infrastructure bottlenecks, a lack of reliable rural broadband and the increased complexity of trade barriers. GGC has and will continue to work with government to develop strategies to seize these opportunities and overcome barriers.

We were pleased to welcome Bernadette Jordan as the new Minister for Rural Economic Development this January. She has been given an important mandate to expand rural broadband access and deepen the government's ties with rural Canada. Grain farmers are a strong part of the rural middle class and are heavily reliant on innovation. We look forward to working with the Minister to help her achieve her mandate to the benefit of our members.

GGC's first major outreach of 2019 took place February 26–28 when we held the second annual National Grains Week. By that time, the House of Commons and Senate will have been back in session for a month and it is a fantastic opportunity to bring grain farmers from across the country to meet with policy makers. Last year's event saw 37 meetings and a very well-attended reception and we expect to see similar engagement this year.

As campaigning gets underway in ridings across Manitoba, we encourage you to reach out to your candidates from all parties to explain what you need on a local level. Stay tuned for more real-time updates from GGC as we get closer to October and I wish everyone a safe and successful plant 2019. ■

[1] https://www.ic.gc.ca/eic/site/098.nsf/eng/00022.html

Soy Canada Perspectives

Ron Davidson, Executive Director, Soy Canada

SOY CANADA

RECORD EXPORTS TO CHINA

Prospects for the Canadian soybean sector are influenced substantively by the outlook for trade with China. Propelled by successive monthly records in October and November, exports by November 30, 2018 totalled 2.8 million tonnes valued at $1.3 billion. The previous 12-month record, set in 2017, was 2.0 million tonnes valued at $998 million. As of the end of November, China accounted for 56% of total Canadian exports by volume (39% in 2017) and 50% by value (36% in 2017).

PRESENCE OF SOYMEAL IN CHINESE FEED FORMULATIONS

Whether or not concluded by the March 1 target date, it is anticipated that a U.S.-China trade deal will eventually be signed. Less certain is whether an outcome of the dispute will be a permanent reduction in the presence of soymeal in Chinese hog and poultry rations.

Some Chinese commentators suggest that, having found it necessary because of the trade dispute to reduce the previously standard of 20 percent soymeal, Chinese feed manufacturers may determine it would be beneficial to continue using a higher level of alternate sources of protein. At a minimum, there could be greater future competition between protein sources than was the practice prior to the disruption in U.S.-China trade.

TRADE MITIGATION PAYMENT TO U.S. PRODUCERS

On December 17, 2018 United States announced the second installment of the U.S. $1.65 per bushel payment to soybean producers as compensation for the trade retaliation by foreign nations. Soy Canada is continuing participation in joint discussions with Agriculture and Agri-Food Canada in an effort to identify the impact on Canadian producers of both the U.S.-China dispute and the U.S. financial compensation payments.

This initiative requires an endeavour to disentangle the impacts of: the U.S.-China trade dispute; the U.S. compensation payments; a record soybean crop in the U.S.; the factors affecting basis payments to Canadian producers; Canada-U.S. currency exchange rates; an increased proportion of Canadian exports to China; a reduced proportion of Canadian exports to 71 other export markets; and, increased U.S. exports to Canada (1.7 million tonnes by November 30, 2018 compared to 1.3 million tonnes at the same date in 2017).

CHINESE APPROVAL OF NEW SOYBEAN TRAITS

Soy Canada believes that new soybean traits must take into consideration key soybean export markets before they are commercialized for production in Canada. On January 8, China announced the approval of two new soybean traits: DAS 44406-6; and, Syngenta SYHTOH2. The former had been awaiting the green light since 2012 and the latter since 2014. Three additional soybean traits are still pending approval by the Chinese regulatory authorities.

TIGHTENING MARKET ACCESS CONSTRAINTS IN THE EUROPEAN UNION

New pesticide assessment and management initiatives being implemented by the European Union have implications for the approval and use of both new and existing pest control products. The registrations of some previously-approved products could be discontinued and the maximum residue limits of others could be reduced or even downgraded to the level of detection.

Soy Canada is coordinating with member organizations, other sector organizations, and the federal government as new actives are proposed for registration and as additional products are added to the EU re-evaluation list.

FUNDING FOR SOYBEAN RESEARCH

Research and innovation are critical contributors to maintaining soybean productivity and competitiveness. On January 15, 2019 Minister of Agriculture and Agri-Food Lawrence MacAulay announced the allocation of $5.4 million of Canadian Agricultural Partnership (CAP) funding for soybean research at public institutions across Canada.

Combined with a $3 million commitment from industry, the initiatives supported by this funding will assist in pursuing the soybean sector's 10-year objectives of: increasing yield; improving quality; enhancing pest resistance; expanding production regions; and, strengthening competitiveness and exports. In addition, two research partnership applications to Genome Canada for the funding of soybean research in public institutions are currently being prepared.

SOYBEAN YIELD TREND IN MANITOBA

Soy Canada is pleased to note Manitoba Agriculture has projected that, among the big five crops, soybeans will provide the second highest profitability per acre after only corn in 2019. Following three successive years (2015, 2016 and 2017) of strong yields (36.4; 41.0; and, 36.1 bushels per acre), a combination of lower rainfall and high temperatures in Manitoba reduced yield in 2018 to an average of 31.1 bushels per acre.

This was the lowest yield recorded in the province since 2011. Notwithstanding significant year-to-year variations, five-year averages in the province have trended consistently upward from 26.0 bushels per acre in 2004–2008 to 31.9 in 2009–2013 and 35.2 in 2014–2018 as seed developers released ever-improved varieties and producers gained experience in growing the crop. ■

Pulse Canada

Exploring Pulse Marketing Opportunities in 2019

PULSE CANADA IS working to grow demand for Canadian pulses by capitalizing on new market opportunities. Several food and ingredient trends in 2019 will help Pulse Canada position pulses as a top choice among consumers:

MAINSTREAMING OF PLANT PROTEIN

No longer a niche market, the plant protein industry has seen tremendous growth over the last several years. According to Nielsen data, retail sales of plant-based foods in the U.S. grew 20% last year compared to 2017. This growth is being fuelled by two major consumer trends: protein and healthy eating.

Research shows that consumers associate plant protein with positive health benefits including better nutrition, weight management and disease prevention. For the average consumer, the trend toward plant protein is not about rejecting animal protein. Rather, it's about expanding the range of dietary choices and making an effort to incorporate more fruits and vegetables into the diet.

Two plant-based food product categories that are currently experiencing major growth are meat and dairy. In 2018, U.S. retail sales of plant-based milks grew 9%. This growth is being driven in part by the widening array of options becoming available to consumers. Oats, hemp, flax, cashew and pea milk are just a few of the choices you can find in the grocery store today. Peas are a good option for plant-based milk manufacturers because they offer high protein. Ripple Foods and Bolthouse Farms are two companies who have launched milk products containing pea ingredients in the last few years.

The plant-based meat category offers even more potential for pulse ingredients. U.S. retail sales of plant-based meats grew by an impressive 23% last year, and several major foodservice providers introduced plant-based options to their menu. An excellent example of this phenomenon is the Beyond Burger, a plant-based burger made from pea protein which is now offered by restaurant chains A&W and Carl's Jr.

Pulse Canada is working to increase pulse ingredient inclusion in plant-based meat products offered in grocery stores and restaurants by conducting research to address knowledge gaps and technical challenges.

RISE OF CONVENIENCE

According to Mintel data, convenience continues to be a key driver of consumer decision-making. Consumers are looking for healthy meal options to suit their fast-paced lifestyle. Many consumers are also looking for 'guilt-free' snacking options, or products that contain ingredients they perceive as healthy.

Pulses can enhance snack foods by offering protein and fibre. Since 2016, Pulse Canada has been promoting the nutritional benefits of pulses to consumers and providing easy ideas for incorporating them into meals and snacks. In the last several years, Pulse Canada has observed a steady rise in the launches of ready-to-eat products containing pulse ingredients. Crackers, chips, bars and beverages are just a few examples of snack products containing pulses that are available on the market today.

GROWING FOCUS ON SUSTAINABILITY

Consumer research shows that the main driver behind the plant-based food trend has been health. More recently, though, consumers have become conscious of the environmental impact of their purchasing decisions.

A Nielsen study found that 48% of consumers in the U.S. are reportedly changing their consumption habits to reduce their impact on the environment. The study found that U.S. Millennials (ages 21–36) are more likely to be motivated by sustainability, and 90% of them are willing to pay more for products with sustainable ingredients.

Governments are also increasingly focused on the environmental impact of the food system. A report published in early January by the EAT-Lancet Commission notes that 'food is the single strongest lever to optimize human health and environmental sustainability on Earth.'

The report, written by more than 30 of the world's leading scientists, provides the first science-based recommendations for a healthy and sustainable food system for the world's growing population. Among the recommendations includes shifting to the 'planetary health diet' which emphasizes the consumption of plant-based foods such as fruits, vegetables, pulses, nuts and whole grains.

With their low carbon and water footprint, pulses will undoubtedly play a key role in the move toward healthier, more sustainable diets. Last year, Pulse Canada partnered with ETH Zurich and the Saskatchewan Research Council to publish research demonstrating the environmental benefits of including pulse ingredients in food products. Pulse Canada will continue to educate food companies and consumers about the environmental benefits of pulses. ■

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Pulse market analysis

Brian Clancey, Senior Market Analyst and Publisher, STAT Communication

WHAT WE KNOW about the dry edible bean situation in North America is limited to what people say because the partial U.S. government shutdown has delayed the final crop report of the year and delayed export trade data.

The impact goes beyond the United States. Statistics Canada will stop updating export trade data as long as the Census Bureau in the United States is not publishing trade data. This means Canadian export data for December and revised data for 2018 will not be available until U.S. data is available.

While it is impossible to say how long the impasse over the budget will continue in the United States, it needs to be stressed that it does not affect the ability of companies to do business. It simply affects official government data and efforts to obtain a third-party view of how many dry edible beans are available and how many have been exported.

The last available data suggests North America has around 2.985 million metric tonnes (MT) of beans available for sale across the 2018–19 marketing year, up slightly from the 2.97 million available the previous marketing year. Both numbers are just above the 2.95 million MT available on average during the previous five marketing years.

Even so, residual supplies of dry edible beans are expected to decline before this year's harvest, possibly dropping from 439,000 to 346,000 MT. Improved demand and problems in other parts of the world have added short-term support to markets.

A key issue through March and April is black bean demand from Brazil. It seems likely the country will buy what is available in Argentina, which could result in a modest increase in production in that country. However, markets expect the next Brazilian harvest to be substantial, resulting in below normal demand as Brazil's harvest advances.

Exporters will be looking to countries like Venezuela to fill any demand gaps since the country needs around 7,000 MT per month. In recent years China has supplied between 10,000 and 23,000 MT of beans per year, compared to as much as 39,000 MT a year, with a good part of the product coming from Canada and the United States via Mexican resellers. Direct shipments from those two countries are nominal.

Argentina is also a major supplier, shipping almost 47,000 MT to Venezuela between January and August of 2018. Last year is on pace to be a record year for movement from Argentina to Venezuela, reflecting slower demand from Brazil for much of 2018.

Doubt has been expressed how many pulses Mexico is likely to produce

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Eight Years on Board Comes to an End

Rick Vaags reflects on his time with Manitoba Pulse & Soybean Growers

Rick Vaags

ALONG A HALLWAY in the Winnipeg Convention Centre, Doug Chorney asked Rick Vaags if he'd consider joining the Manitoba Pulse & Soybean Growers (MPSG) board.

This happened in 2011. Doug, the current assistant chief commissioner of the Canadian Grain Commission, was president of Keystone Ag Producers at the time. Rick remembers this exchange in such vivid detail it could have been yesterday.

"It's only three meetings per year," Rick recalled someone saying. He chuckled, adding, "It turned out to be a lot more than that."

In his eight years on the board, Rick has logged more than 180 days in service to MPSG, an experience he says was, "An absolute game changer. It's been an incredible time. I mean, sometimes the road conditions weren't that great, but I enjoyed going to every meeting."

This year, Rick retired as an MPSG director. He and his wife, Anny, farm near Dugald, Manitoba.

Rick was a passionate director. And his time with MPSG reflected that. He sat on numerous committees – Pulse Canada, Grain Growers of Canada, a brief stint with a now disbanded market development committee, and Ag in the Classroom, an organization Rick enthusiastically champions every chance he gets to do so.

"If you can start educating people about agriculture at a young age, they will take that knowledge back to their parents and that has the potential to benefit our industry greatly," he said.

Rick is also passionate about agriculture – about creating opportunities for his boys and others to become leaders like he is and like his dad was. Rick's late father, Bill Vaags, is a Manitoba Agricultural Hall of Fame inductee and the recipient, along with Rick's mom, Bertha, of the Manitoba Farm Family of the Year.

Rick is proud of his parents and what they have done for agriculture. He and Anny still attend all the award ceremonies they can, finding it valuable to celebrate others who are making a mark in agriculture.

He was quite nervous about being a director, at first. This changed over time as he became accustomed to how the machinery of being a director

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this year. However, those ideas are not without controversy. Some market participants see it as nothing more than an effort to find a bullish lining in clouds that appear otherwise neutral for price and demand.

One measure of the health of dry edible bean markets is the spot market price index for grower markets in the United States. By the last half of January, the index was in decile two territory. That means that it has been higher over 70% of the time since 2007. The index is weighted for average production levels by each class of beans grown in the United States. That means it is a good indicator of where grower bids are for the dry bean complex in historic terms. But, it does not mean they will go higher, it simply defines the percentage risk of lower prices and the percentage chance they will go higher in the future.

One implication is that it might be hard for seeded area to change significantly this year, with the result a return to average yields could actually see output slip slightly. But, even with demand expected to rise somewhat in the 2019–20 marketing campaign, the stocks-to-use ratio will probably remain above 15% or enough product to cover two months of normal demand.

While not excessive, it gives processors and exporters a cushion at the start of the coming shipping season if crops are hurt during flowering by forecasts of above normal temperatures in parts of North America. That could be partly offset by ideas rainfall might also be above normal. If that combination happens, some farmers wonder if they will be shaken out of bed during the night by fast-growing crops.

Timing is everything when precipitation is above average. Too much rain in the spring delays seeding, while too much rain in August and September can delay harvests and hurt quality, resulting in an increase of stained product. Canadians have a lot of experience with these combinations of above normal heat and above normal rain, sometimes seeing bumper crops turn into a marketing nightmare because of quality issues.

Without any production problems, North American dry edible bean prices have the potential to be somewhat higher on average in the coming marketing year. That is reflected in little difference between spot and new crop bids to farmers for many classes of beans. Markets are asking farmers to stick with beans, with some processors hoping bids will encourage some growers to expand production based on the notion prices could trend upwards after harvest. ■

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worked. He saw budgets grow, the kinds of research projects intensify and the organization in general evolve into what it is today.

"I worked with great people," he said. "The board was always professional, respectful and never did I feel anyone came to the table with a specific agenda. As a group we were entrusted with farmer money and we took the job of being stewards of that money very seriously."

Rick was on MPSG's board when it first agreed to work with Ron Tone to create what is now the On-Farm Network, a widely celebrated and ever expanding program that gives farmers the tools to conduct research on their own fields.

"I remember those first meetings," recalled Rick. "I remember endorsing it. And seeing what it has become, I'm honoured to have been a part of it."

The On-Farm Network now boasts about 100 trials and operates in collaboration with other commodity groups. The Network hosts an annual appreciation dinner for the participating farmers and it was at the last dinner at Richardson's Kelburn Farm when Rick was struck by just how successful this program had become, how vital it is to the ag industry and how much the farmers appreciate it.

Behind the machinery and behind the day-to-day of running a farm, the agricultural sector churns. The work commodity groups such as MPSG does is largely behind the scenes and much of it goes unrecognized.

Rick is okay with that. He was not in it for recognition. He has proud moments, all of which he attributes to the work of the entire team.

"I remember when Soy Canada was formed and I'll never forget our push to ensure their mandate would include more than just non-GM soybeans. We needed to be convinced that it truly represented western Canada production before we agreed. It does. I was a part of that. This is the kind of experience I want our young leaders to have."

He watched many organizations around him transform into what they are today. He's happy to have played a role in many of those histories.

Rick will miss the involvement. He will miss tackling burning issues and being a steward of farmer money.

"I feel like I lucked out with MPSG," he said. "It is a solid organization."

But Rick, like his father, is not done contributing to his community. He continues to sit as a District 5 representative on the Keystone Agricultural Producers board and he's involved in his local Canadian Foodgrains Bank chapter called SAFARI, a name he came up with that refers to Springfield Area Farmers Aiding Relief Internationally.

"Agriculture is a large family. I'm going to miss the great people I met over the last eight years. I would like to thank Manitoba's pulse and soybean farmers for giving me this life-changing opportunity. It's been a blast. It's been an honour." ■

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Message from Director of Research and Production

Daryl Domitruk, PhD, PAg, Director of Research and Production, MPSG

Agri-Science Clusters – *Now, That's Collaboration!*

LOOKING AHEAD TO the summer edition of *Pulse Beat*, readers can expect a summary of the current projects receiving funding from MPSG. At this point in the cycle the list is lengthy. In this issue we would like to highlight a specific batch of projects that are underway in conjunction with our sister organizations across Canada. These organizations have been brought together under Agriculture and Agri-Food Canada's Agri-Science Clusters program, which is funded by the Canadian Agricultural Partnership (CAP). The program enables grower organizations and other private sector players to pool their funds in order to access federal funds, researchers and research facilities. The federal government matches industry dollars on a 70/30 or 50/50 (federal government/industry) basis. Projects are conducted within the five-year CAP timeframe 2018–2023.

MPSG has signed on to three Agri-Science Clusters with one more being finalized. Each one links researchers across Canada to work on issues important to Manitoba. For example, an AAFC plant pathologist in one prairie province may be linked with a plant breeder in Ontario who is enabled to work with an agronomist at a third location back on the prairies. For individual farmer organizations such connections are cumbersome to make flying solo. Plus, farmers can achieve much greater leverage of their funds. The following defines the focus of each Agri-Science Cluster, as well as the combined funding from AAFC and industry.

SOYBEAN CLUSTER

Focus – root diseases, breeding short-season non-GMO varieties, improving protein content

Total cluster funding – $8,400,000. MPSG funding: $568,000

Partners – Grain Farmers of Ontario, Producteurs de grains du Québec, Saskatchewan Pulse Growers, Atlantic Grains Council, SECAN

PULSE CLUSTER

Focus – dry bean breeding, pea breeding, root and foliar diseases, pulse food ingredients

Total cluster funding – $18,300,000. MPSG funding: $1,418,000

Partners – Alberta Pulse Growers. Saskatchewan Pulse Growers, Ontario Bean Growers

INTEGRATED CROP AGRONOMY CLUSTER

Focus – weed, insect and disease surveys, glyphosate-resistant Kochia, cover crops, economics of crop rotations

Total cluster funding – $9,000,000. MPSG funding: $228,000

Partners – Western Grains Research Foundation, Alberta Pulse Growers, Alberta Wheat Commission, Brewing and Malting Barley Research Institute, Manitoba Canola Growers Association, Manitoba Wheat and Barley Growers Association, Prairie Oat Growers Association, Saskatchewan Canola Development Commission, Saskatchewan Pulse Growers, Saskatchewan Wheat Development Commission.

ORGANIC SCIENCE CLUSTER

Focus – breeding organic soybeans, weed-insect-disease management, crop nutrition, soil health, ecosystem services, integrating crop and livestock production

Total cluster funding – $12,600,000. MPSG funding: $20,000

Partners – Organic Federation of Canada, Western Grains Research Foundation, Organic Council of Ontario, Grain Farmers of Ontario and over 66 other partners. ■

What Can We Expect from Soybeans After a Dry Year or Two?

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

Cassandra Tkachuk, MSc, PAg, CCA, Production Specialist – East, MPSG

DROUGHT STRESS WAS the reality for many soybean farmers in 2018 and, to a lesser extent, 2017. Signs of this included wilted plants, flipped leaves and rapid maturity. This was perhaps the first time that soybean farmers experienced two consecutively dry growing seasons in Manitoba. But what impact did this have on the crop? And how do we mitigate our risk in the future?

YIELD

Moisture extremes account for 71% of yield loss in all crops, according to long-term Manitoba Agricultural Services Corporation (MASC) data. For soybeans, excess moisture was responsible for 91% of yield loss in 2016 and drought for 90% in 2017 (Figure 1). This gives an estimate of the proportion, not the actual amount of yield lost. But it certainly points to the impact of moisture extremes in Manitoba.

Looking back at the past three growing seasons, we can see differences in the general performance of legumes under different moisture levels. Manitoba recorded its highest average soybean yield of 42 bu/ac under the wet conditions in 2016. Whereas dry conditions in 2017 and 2018 resulted in 34 and 32 bu/ac yield averages, respectively (Table 1). The opposite is seen for peas and beans, which performed better in dry years, on average.

Assessing numbers province-wide can only tell us so much. What really influenced yield in 2018 was the timing and amount of precipitation. For pulses and soybeans, the need for water increases as the season progresses and the most critical period to have water available is from flowering to pod-fill. So if you didn't get timely rainfall from July to August, your soybean crop likely suffered. See Table 2 for the cause of soybean yield loss based on the timing of drought and heat stress during the critical time of water uptake.

Figure 1. Post-seeding causes of soybean yield loss in 2016 and 2017 (MASC).

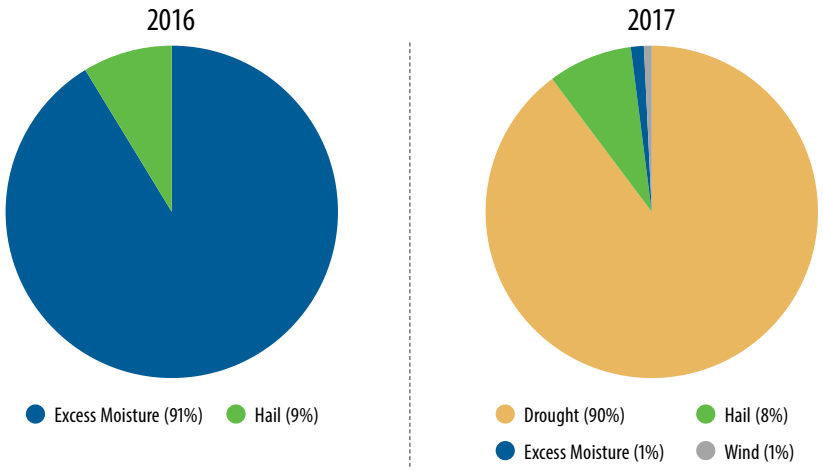

Table 1. Average yields of soybeans, field peas and dry beans in Manitoba from 2016–2018 (MASC).

	2016 Yield	2017 Yield	2018 Yield
		bu/ac	
Soybeans	42	34	32
Field Peas	35	53	49
		lbs/ac	
Pinto beans	1,658	2,116	1,961
Navy beans	1,870	2,009	1,815
Black beans	1,606	1,997	1,723
Kidney beans	1,207	1,892	1,504

Table 2. The cause of soybean yield loss based on the time of drought and heat stress.

Time of Drought and Heat Stress		Cause of Soybean Yield Loss
Full flower (R2)	Mid-July	• Plants abort flowers • Flowering period shortened
Early pod (R3)	Late July	• Plants abort flowers and pods
Pod elongation (R4) Seed development (R5)	Early to Mid-August	• Number of pods per plant reduced • Number of seeds per pod reduced • Seed size reduced
Full seed (R6)	Late August	• Seed size reduced

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For years, farmers and agronomists have noticed that soybeans perform well in wet conditions. Research by Dr. Ramona Mohr at AAFC has helped explain these observations. Her study tested the impact of excess, rainfed and deficit moisture on soybeans grown at Carberry and Portage from 2014 to 2017. Excess moisture treatments yielded the same or better than rainfed soybeans in all cases, despite visible symptoms of stress from excess moisture. Deficit moisture, on the other hand, reduced soybean yield by 16–32%. This suggests that deficit moisture is the extreme we should worry about more for soybean production. For more information on this study, see *Pulse Beat: The Science Edition, Issue 3*.

Over the past two years, we have observed that soybeans appear to be good at accessing soil moisture. Under drought stress, plants can sacrifice aboveground growth to put more resources into root growth. This means an improved ability of roots to search for soil water. The benefit of increased rooting depth was likely more pronounced in 2017 due to leftover soil moisture from 2016 and better-than-expected yields in the face of dry conditions. However, the drawdown of soil moisture reserves and lack of precipitation throughout 2017 made it harder for plants to access soil water in 2018.

SOIL MOISTURE CONSERVATION

What dictates moisture deficit in Manitoba is the amount of soil water present from the previous year. Over the long-term, precipitation at most locations in Manitoba actually falls short of the soybean water requirement. Therefore, management practices that maintain soil moisture will help mitigate the risk of drought stress. Think of soil moisture as an investment in next year's crop.

Moisture conservation starts with soil management. Reduced and no-till have been adopted by many farms in Manitoba with great success over the years. Maintaining crop residues at the soil surface improves crop water use efficiency, water infiltration, organic matter and microbial activity in the soil. Surface residue will also provide a barrier to soil water evaporation and protect the soil from intense rainfall energy and excessive solar radiation.

Flipped soybean leaves due to drought stress in late July 2018.

Reducing tillage of low-residue pulse and soybean crops was discussed in last issue's *Bean Report*, highlighting results from Dr. Yvonne Lawley's University of Manitoba (U of M) soybean residue management study. This on-farm experiment confirmed that tillage is not a necessity for soybean residue and that the lack of tillage had no negative impact on subsequent wheat and corn yields. If you feel that no-till isn't quite right for you, consider reducing your tillage – especially in dry years. Or reach out to your fellow farmers who are seeing the benefits of less tillage.

PLANT ESTABLISHMENT

Establishing a strong crop in spring is possibly the best method to combat a multitude of stressors throughout the growing season, including moisture stress. This is true for any crop. It may be tempting to reduce seeding rates to save money, but seed is your best investment. If you are looking to save money, aim to cut costs not investments.

In the dry spring of 2018, farmers were faced with seeding depth decisions — to plant at the current recommendation of ½ to 1 ½ inches deep or to chase soil moisture and plant deeper. Recent research results from Kristen P. MacMillan's lab at the U of M has shed some light on this decision. Results of this study can be found on page 20 – *Soybean Seeding Decisions – Seeding Window and Seeding Depth Trial Results from 2017 and 2018*.

Estimating seed survival is a key component in determining the best seeding rate. This varies with seeding equipment, seed lot quality and environmental conditions. Under dry conditions, survival may be reduced. Keeping records of plant stand assessments is a great way to accurately estimate seed survival over time. But if you are looking for a starting point this spring, we have a few tips:

- Assume 70–75% survival if planting with an air seeder and 80–85% with a planter. Assume lower survival if you are expecting dry planting conditions.
- Conduct germination and soak tests. Soak test: Place 200 seeds in water and calculate the percentage of seed coats that slough off. Seeds that lose their seed coat will not produce a viable plant.
- Use the *Bean App Seeding Rate Calculator* and *Plant Stand Assessor* with research-based recommendations.

Adequate plant stands will improve crop resiliency against pest pressure. Take weeds for example. Soybeans are already poor competitors and placed at greater risk of yield loss if plant stand is reduced.

Research conducted by Dr. Rob Gulden at the U of M on the critical period of weed control (CPWC) has found that soybeans must remain free of weeds until the V2–V4 stages, on average. However, the CPWC ranged anywhere from VE–R1, meaning yield loss can occur until flowering in some cases. This work also found that narrow rows and higher seeding rates can reduce the CPWC by one to three growth stages. This means that a more competitive crop will be better suited to handling stress and, in this case, save time and money spent on weed control. For more information on this project, see *Pulse Beat: The Science Edition, Issue 3*.

APPROACHING SPRING 2019

The 2019 growing season is projected to be wetter than the past two years, which is good news for soybeans and overall soil moisture replenishment. Improved varieties and stronger agronomic decisions mean soybeans are becoming more adapted to our prairie environment. We can't do much about Mother Nature, but we can manage our investments. ■

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Soybean Seeding Decisions – Seeding Window and Seeding Depth Trial Results from 2017 and 2018

An update from the soybean and pulse agronomy lab

Kristen P. MacMillan, MSc, PAg, Research Agronomist, Department of Plant Science, University of Manitoba

WHAT SEEDING DATE and depth maximizes soybean yield? Seeding within the first three weeks of May and within the range of 0.5 to 1.5 inches has provided the most consistent yield advantage among the environments tested so far in these experiments. But, that doesn't come without variability.

SOYBEAN SEEDING DEPTH

Soybean seeding depths between 0.25 and 2.25 inches were tested at Arborg (clay soil) and Carman (loam soil) in 2017 and 2018. Trials were seeded between May 14 to 24 into dry soil conditions, much like many crops these past two years.

At the time of seeding, moist soil was down around 1.25 inches in 2018 and an accumulated 25 mm of rain took about 14 and 21 days in 2017 and 2018, respectively. In the combined analysis (excluding Arborg in 2017), both environment, seed depth and their interaction were significant. In other words, the effect of seed depth on soybean yield varied by environment (Figure 1).

In both years at Arborg, seed depth did not affect soybean yield. This made sense in 2017 when the depth range tested was only 0.25 to 1.75 inches and the trial was seeded into fallow land. In 2018, a trend was evident but variability restricted statistical differences. Now let's turn to Carman – at Carman in 2017, soybean yield was reduced by 25% when seeded at 2.25 inches compared to 0.5 and 0.75 inches. The other seed depths produced yields similar to all other treatments. This was the only environment where yield was significantly reduced with deep seeding.

At Carman in 2018, soybean yield was reduced by 20% with shallow seeding (0.25 inch) compared to seeding at 1.25 to 1.5 inches. The other depths were statistically similar to all others. It's important to discuss interactions when they occur, like we just did, but it also makes recommendations across a range of environments difficult. That's why we say "it depends" a lot. When looking at the combined analysis and overall effect of seed depth on yield, the same trend exists at each environment – although to different degrees, which leads to the interaction.

Even though yield loss with deep or shallow seeding is not large every time, when it does occur (one in four environments thus far), it is substantial (20–25%). This leads me to the preliminary conclusion that seeding within the range of 0.5 to 1.5 inches will likely optimize yield in the long run. Factors such as soil moisture, soil type, residue management, land rolling, moisture holding capacity, compaction risk and rain forecast should guide your actual depth within that range.

What factors are driving the yield effect? Plant establishment is one factor that may be contributing to the effect of seed depth on yield as shown in Figure 2. Across environments, it shows a similar trend to yield where emergence is reduced with shallow and deep seeding. However, it is not the only factor. At Carman in 2017, soybeans seeded at

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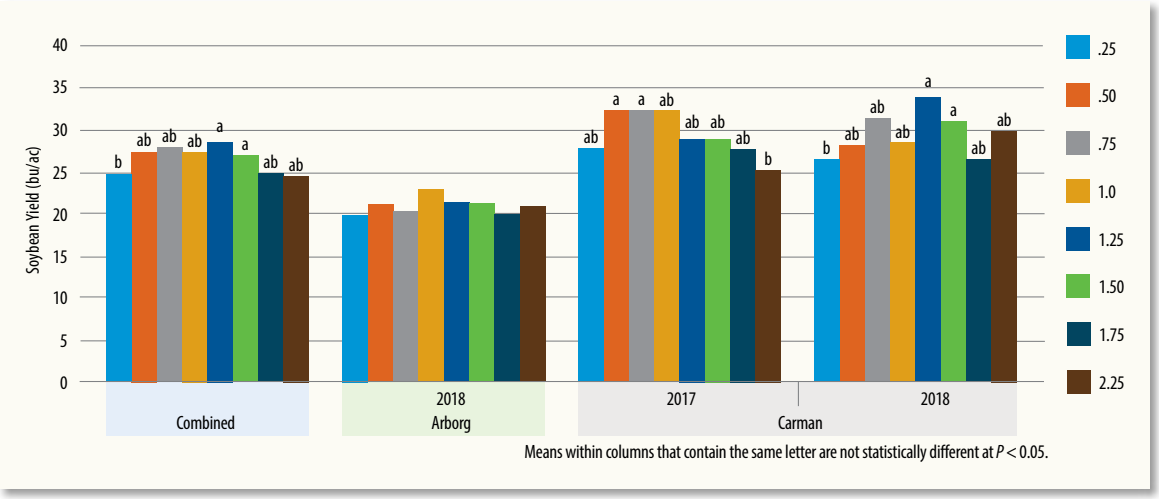


Figure 1. Effect of soybean seeding depth on yield across environments (combined) and by environment.

Figure 2. Effect of soybean seeding depth on established plant population and % emergence among environments.

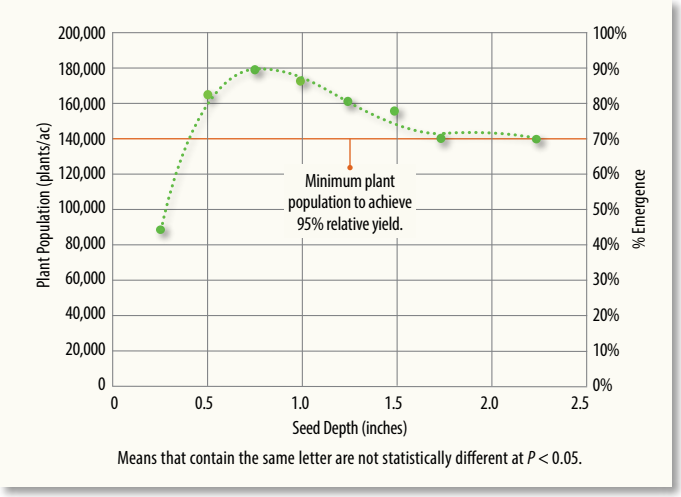
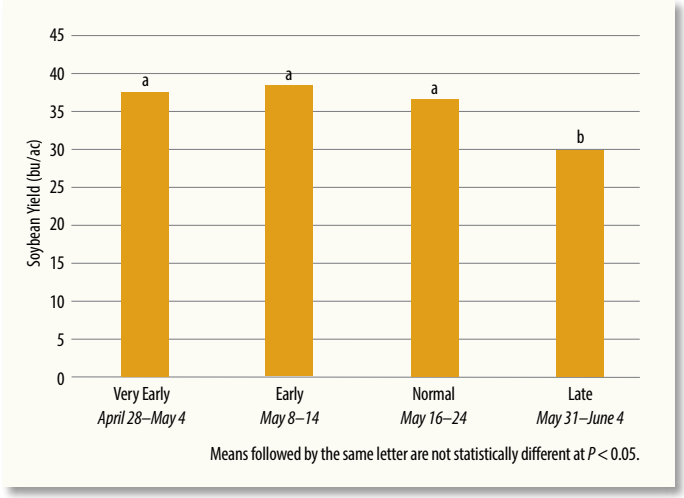


Figure 3. Soybean seedlings emerging from 0.5 to 2.25 inches seed depth (L–R), seven days after seeding on May 24, 2017. As depth increases, emergence is slower and vigour is reduced.

2.25 inches had a good plant population and still had a 25% yield reduction.

There is a visible impact of deep seeding on soybean seedlings – they emerge slower and symptoms of hypocotyl swelling and chlorosis are evident, leading to reduced seedling vigour (Figure 3). Seeding soybeans too shallow (0.25 inches) are also more prone to moisture fluctuations, resulting in wetting and drying of the seed which leads to poor germination and establishment. To identify other mechanisms contributing to yield differences, we measured the effect of seed depth on pod height in 2018 and we plan to measure nodulation and root rot in 2019, which will be the last year of the study.

Figure 4. Soybean yield by seeding window across seven site-years in Manitoba from 2017–2018.



SOYBEAN SEEDING WINDOW

We seeded soybeans within four seeding windows (very early, early, normal and late) from April 28 to June 4 at Arborg, Carman, Dauphin (2018 only) and Melita over the past two years to determine if there is an optimum time to plant soybeans and if that varies by environment.

Overall, soybean yields ranged from 21–40 bu/ac in this study, except for Dauphin in 2018, which yielded an incredible 64 bu/ac. Preliminary results show that the seeding window that optimized yield varied by environment. However, I am going to present the overall main effect of seeding date because the trend was present in each environment. Overall, seeding within the first three weeks of May optimized yield (Figure 4). There is no clear recommendation to seed soybeans as early as possible, which we hear from southern growing regions.

Whether you should seed the first, second or third week of May to maximize yield varies by site-year/environment (data not shown). For example, yield maximization occurred in the first/very early seeding window at three out of seven environments (Arborg 2017, Carman 2018 and Melita 2018) – out-yielding the second and third dates by 2–12%. In the remaining four environments, the second/early seeding window maximized yield by 1–14% compared to the first and third. These differences between the first three seeding windows were rarely statistically different and, on average, were within 4% of the maximum yield (range 1–14%). To me, these differences are acceptable and difficult if not near impossible to predict.

Seeding itself is also not that precise – it's dictated by weather, field conditions, crop priority and equipment. This data tells us that the soybean seeding window in Manitoba is quite flexible up to about May 24, with yield maximization generally occurring in the first or second week. Exactly when you seed within that window will depend on the conditions listed previously and your last spring frost date. ■

Precise Pest Identification

ONE OF MPSG'S objectives is to research and extend ways to reduce the costs of pest control. Of course, the cost/benefit of crop protection chemicals in particular is a popular subject among farmers; much of the up-front cost of conventional pest management appears in the invoices for these products. However, research also needs to address potential non-invoice costs that could be incurred in the event pest control practices fail to mesh with the requirements of trade, regulation, social license and customer satisfaction.

MPSG believes it is in the farmers' best interest to continually scrutinize pest control methods. With Canada's endowment of effective crop protection products, product stewardship is something the entire supply chain takes seriously. Unwarranted use of products has invoice and non-invoice implications for farmers. Skipping a warranted application can have much the same result. Weaknesses in conventional pulse and soybean pest control programs leaves farmers vulnerable. Sometimes farmers really don't know if a pest is present and, if it is confirmed, the number of weed, insect or disease organisms necessary to cause economic harm is not known. Even then, confirming the presence of a pest species isn't enough when the seriousness of the pest varies by sub-species or race. It would improve stewardship if farmers could confidently avoid "insurance" applications and be more discriminating when purchasing bundled products.

The challenge is complex. However, having decided to wade in on behalf of farmers, MPSG continues to sponsor studies that seek to definitively characterize the presence and threat level of crop pests. The following articles from Dr. Bryan Cassone and Dr. Debra McLaren represent a sample of current projects. ■

FARMER FOCUSED

A wireworm collected from a Manitoba field.

Risk Assessment of Wireworms in Manitoba Fields

Bryan Cassone, Kiana Wiebe and Ivan Drahun, Brandon University

WHAT ARE WIREWORMS?

Wireworms are the soil-dwelling larvae of click beetles. They are slender, hard bodied, yellowish to brown-orange with short legs. The size of fully-grown larvae varies between species, but are usually no longer than 25 mm. There are at least 30 pest species of wireworm in Canada, and several are found in Manitoba. What makes wireworms unique among insect pests is their long-life span. The adult beetles deposit their eggs in the soil during the summer. The newly hatched larvae can spend several years in the soil before emerging as adults. Our most common species in Manitoba generally spends two to three years as a larva in the soil, but for other species the life cycle can be five or more years.

WHY ARE WIREWORMS IMPORTANT TO MANITOBA CROP PRODUCTION?

While the adult beetles are harmless, the larvae are voracious eaters and can cause significant crop damage.

Wireworms are pests of many agricultural crops, including soybeans, corn, sorghum, small grains, and potatoes. Wireworm injury to soybeans occur mainly during the early stages of plant growth. They feed on and damage one or more portions of a seed or can completely hollow it out, leaving only the seed coat. Wireworms may also cut off small roots or tunnel into the underground portions of seedlings, causing young plants to appear stunted or wilted. Damage to either the seed or seedling can result in gaps within the rows, lowering overall crop yields. If infestations are severe enough, they can decimate the crop yields for an entire field, although this is not common in Manitoba. Given their long larval lifespan, once wireworms establish in a field, they can pose a serious risk to the crops in rotation for years to come.

HOW DO WE DETERMINE IF A FIELD IS INFESTED WITH WIREWORMS?

There are two methods commonly used to estimate the presence and/or abundance of wireworms in a field: soil coring and bait trapping. Soil coring involves the direct sampling of known volumes of soil and counting the wireworms present. This method provides information on the number of wireworms but is labour intensive (several dozen samples must be taken per field) and can underestimate abundance in fields where population densities are low. Bait traps work by releasing carbon dioxide (CO_2)into the soil, which serves as an attractant for wireworms. Several different baits exist, which commonly contain vegetables and/or cereal food mixtures. The traps are placed about a foot underground for 10–14 days and are then brought back to the laboratory to extract the wireworms. Competing CO_2 sources from an abundance of plants in the soil around where the baits are buried can greatly reduce the number of wireworms recovered.

WIREWORMS ARE NOT UNCOMMON IN MANITOBA

In 2018, we carried out surveys of wireworm presence and abundance in 22 crop fields throughout southern Manitoba. Each field included in the survey had previously suspected a presence of wireworms and was scouted three times during the growing season. Far and away the best time to trap wireworms was in the spring prior to planting, presumably due to the ideal soil temperatures and lack of competing CO_2 sources. Preliminary results confirm previous findings from the Prairie Pest Monitoring Network. Of the wireworms

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A typical bait trap composed of vermiculite and spring wheat. This trap is placed one foot underground in a field for 12 days. The germinating seed produces carbon dioxide, which attracts wireworms.

Brandon University students setting up bait traps during the spring and fall surveys.

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sampled, the species *Hypnoidus bicolor* predominated (94% of wireworms identified) but five other known pest species were also found.

HOW TO CONTROL WIREWORMS

Wireworms were effectively managed by the pesticide lindane until its government-issued ban in 2004. Since then, there has been concern the population may be growing and spreading. There are no effective ways to control the pest after the crop is planted, but there are a variety of seed treatments available. Most of these belong to a group of insecticides called neonicotinoids, some of which are currently under review. Although they rarely cause mortality, these insectistatic compounds protect seeds and seedlings from wireworms. The feeding larvae become moribund and sluggish, allowing the plant time to develop stem and root systems that are strong enough to withstand future attack. Other control methods include crop rotation (buckwheat and mustard are good options), intense plowing (which may often not be practical because of soil health consequences), and soil flooding.

Wireworms are extracted from bait traps manually and by using funnels and heat lamps.

OUR NEXT STEPS

We will continue to scout wireworms throughout southern Manitoba fields during the 2019 and 2020 production cycles. Collected wireworms also undergo genetic analyses to better determine species composition (wireworms are known to be "cryptic" where two or more species can look the exact same) and to assess their ability to disperse between fields. We are also carrying out climate-controlled assays to directly evaluate wireworm behaviour and damage to soybeans under different conditions (such as soil type and temperature). This data will inform economic thresholds of wireworm damage, which are sorely needed for management recommendations. ■

Would you like to have your field scouted for wireworms?

We are looking for southern Manitoba crop fields to survey for wireworms in 2019. If interested, please contact

Bryan Cassone by email **cassoneb@brandonu.ca** or phone **204-727-7333**

A crop rotation history that includes soybeans is desirable but not compulsory.

Photo credit: S.F. Huang/K.F. Chang

Soybean plants affected by severe root rot in low-lying areas exhibiting premature yellowing. Plants in the upland areas are green and healthier.

Survey of Soybean, Field Pea and Dry Bean Root Rots in Manitoba

Debra McLaren, Robert Conner, Yong Min Kim, Holly Derksen, Waldo Penner, Melanie Thompson, Tom Henderson, Teri Kerley, Agriculture and Agri-Food Canada

THE ROOT ROT disease complex of pulse and soybean crops is made up of a diverse group of pathogens and causes damping-off, seedling blight, root rot and reduced stand establishment. Root rot symptoms are often overlooked by farmers seeking to identify the cause of under performance in a crop. As a result, the importance of root diseases on pulses and soybeans has frequently been underestimated, but in recent years there have been an increasing number of reports of severe losses in plant stand and yield caused by root rot.

Above-ground symptoms of root rot are usually most apparent when the crop is subjected to a combination of moisture stress, poor drainage or soil compaction. Early infection can result in seed death, seedling blight, reduced stand density, root rot and yield loss. Yield loss is difficult to assess because severe symptoms often are not evenly distributed within a field. Additionally, uneven plant stands resulting from poor germination and seedling blight frequently result in subsequent difficulty in managing weeds in those areas.

Annual surveys of farmer fields for root diseases in soybeans, dry beans and field peas have been conducted to determine the prevalence and severity of each disease, to identify the common root pathogens and to detect the presence of any new root diseases. These annual surveys date back over 15 years for dry beans and field peas. As soybeans are a relatively new crop to Manitoba, the annual soybean root disease surveys only began in 2013.

The percentage of crops with disease in the pea and bean fields surveyed has increased over the years. During the five-year survey period of 2014 to 2018 (Table 1), on average 99% of pea and 100% of bean fields had root rot, as compared to 86% of pea and 96% of bean fields in 2004 to 2008 (Table 1).

Root disease severity was rated on a scale of 0 (no disease) to 9 (death of plant). The average disease severity in pea fields was similar for both five-year periods (3.1 and 3.3), but in dry beans, disease severity increased from 3.3 (2004–2008) to 4.5 (2014–2018) (Table 1). An average root rot severity rating above four indicates that symptoms were present on 50% of the root system and plants were stunted resulting in a detrimental effect on yield. On average, 66% of dry bean fields had root rot severity ratings above four (2014–2018) compared with 32% in earlier years. In 2016, a wet year, one soybean field had

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Table 1. Root rot in field peas, dry beans and soybeans over the last five years (2014–2018) compared to 2004–2008.

Field Pea Root Rot			Dry Bean Root Rot			Soybean Root Rot		
Year	% of crops with root rot	Mean disease severity (0–9)	Year	% of crops with root rot	Mean disease severity (0–9)	Year	% of crops with root rot	Mean disease severity (0–9)
2014	100	3.1	2014	100	4.6	2014	100	4.6
2015	98	3.0	2015	100	3.8	2015	98	4.3
2016	100	2.8	2016	100	5.5	2016	100	5.6
2017	100	3.6	2017	100	4.2	2017	100	4.4
2018	100	3.1	2018	100	4.6	2018	100	4.8
2014–2018	99	3.1	2014–2018	100	4.5	2014–2018	99	4.7
2004–2008	86	3.3	2004–2008	96	3.3	n/a	n/a	n/a

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a root rot severity of 7.7, which would have severely affected yield. In the same year, a pea and a bean field were found with root rot severities of 5.9 and 7.0, respectively, which also would have impacted yield.

Our research has shown that root rot of soybeans, beans and peas in Manitoba is primarily caused by several species of the fungus *Fusarium*. Aphanomyces root rot, a relatively new root disease in peas, is also of concern. Molecular genetic research has been underway that will enable the rapid identification of the various root pathogens of these crops, which will also allow their quantification in the soil and within infected plant tissue. This will enable the identification of the causal agents of soybean root diseases to be completed in hours rather than in weeks as is currently the case with conventional fungal identification procedures. The ability to rapidly quantify spore concentrations in soils will assist in the identification of fields where the risk of severe damage from root diseases is high, so they can be avoided for subsequent susceptible crops and instead be seeded to other non-host crops until inoculum levels decline.

Research has been carried out to identify commercial soybean, pea and bean cultivars with resistance to many of the *Fusarium* species that can attack the roots of these crops. This information has been shared with breeders to assist them in the development of new cultivars with partial resistance to the wide array of *Fusarium* species. It is critically important to quantify the magnitude and nature of damage caused by root disease in order to determine the need for developing and implementing new disease management strategies. Moreover, understanding the disease-yield relationships is needed for measuring the agronomic efficacy and economic benefits of these management measures.

Currently control measures for root diseases of soybeans, peas and beans are somewhat limited. If inoculum levels are high for root rot, crop rotations of five years or more with non-host crops like cereals and certain oilseed crops are effective in reducing populations of the pathogens in the soil, so there is less disease and yield loss when susceptible crops are grown. Planting into warm, well-drained soils will reduce the severity of root diseases. Agricultural practices that promote plant growth such as adequate soil fertilization and avoiding soil compaction will also reduce the adverse effects of root diseases on these crops. A number of fungicide seed treatments are available for the control of seedling blight caused by root pathogens, but most products do not persist long enough to effectively control root diseases past the seedling stage. In the future, resistance to root rot diseases in soybeans, peas and dry beans will become more common enabling better disease control and reducing losses in seed yield. ■

Soybean Seed Treatments: Assessing Your Risk

THE FOLLOWING RISK assessment was developed to help farmers and agronomists identify where seed treatments are most likely to be beneficial by describing the factors that influence soil insect populations and fungal pathogens. The targeted use of seed treatments supports an integrated pest management approach, which takes into consideration both economic and environmental factors.

For each soybean field, review the risk factors and considerations outlined in the table on the following page to determine your risk of early-season insect pests. If your risk is low, consider ordering and planting fungicide-only, or bare seed.

CONSIDERATIONS FOR USING A FUNGICIDE-ONLY SEED TREATMENT

- Fungicide seed treatment can help provide control over seedling and root rot pathogens in soybeans, including *Rhizoctonia solani, Fusarium spp.*, *Pythium spp.*, and *Phytophthora sojae*. It is important to remember that seed treatment can only provide protection for two to three weeks beginning at the time of planting (not emergence). These diseases can also cause issues later in the season if conditions are conducive for infection; therefore, seed treatment is not a complete solution.
- Fungicide seed treatment can be of greater benefit if there is a history of seedling disease or root rot, or if conditions are cool and wet at planting. Overall, planting into warm, well-drained soils at the proper depth (0.5–1.5 inches) will allow the plant to quickly emerge and have vigorous

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Insect risks in soybeans that may be reduced by an insecticide seed treatment.

WIREWORMS

Risk Factors	Things to Consider
• Known history of wireworm infestations. • Seeding into cold soils. • Recent conversion from grassland to annual cropping. • Sandy to silty soil types.	• Larvae can persist in the soil for four to 11 years. • Current seed treatments reduce feeding activity and result in low mortality. • Economic levels are sporadic over time, across regions and within fields. • Research on monitoring techniques and damage to soybean crops is underway in Manitoba.

SEEDCORN MAGGOT

Risk Factors	Things to Consider
• Tillage incorporating live plants (cover crops, heavy weed growth) into the soil prior to seeding. • Recent application of manure in the spring. • Seeding into cold, wet soil causing delayed emergence.	• Seedcorn maggot is a sporadic pest of soybeans. • Typically only at damaging levels when tillage and manure practices provide attractive egg-laying sites. • Economic levels are sporadic over time, across regions and within fields.

Insect risks in soybeans that are not likely to be reduced by an insecticide seed treatment.

SOYBEAN APHID

- High populations of soybean aphids are erratic and do not occur every year in Manitoba. Winter survival is likely low due to cold temperatures that prevent egg survival.
- Arrival of soybean aphids is predominantly by southern winds as early as July, which is outside the window of seed treatment control.

CUTWORMS

- Current insecticide-based seed treatments on soybeans do not provide effective control of cutworms.
- Cutworm populations should be monitored regardless of seed treatment choice.

BEAN LEAF BEETLE

- Bean leaf beetle is on the label of some insecticide seed treatments for soybeans, but established populations are NOT known to occur in Manitoba.

NOTE: Imidacloprid, thiamethoxam and clothianidin are all facing proposed bans by the Pesticide Management Regulatory Agency (PMRA).

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plant growth. A strong, healthy plant is better equipped to defend itself against disease if conditions become less than ideal later in the growing season.

- Crop rotation is important to reduce seedling disease and root rot from *Phytophthora sojae* (the causal agent of Phytophthora root rot in soybeans) because soybean is the only host plant. Other common pathogens that cause seedling disease and root rot (*Fusarium spp.*) have a wide host range.

For each soybean field, review the risk factors and considerations to determine your risk of seedling diseases and root rots. Prevention strategies include crop rotation and genetic resistance of soybean varieties (if available). It is important to remember that seed treatment is only effective until the very early V-stages.

It is difficult to distinguish root rot pathogens from one another. Shared symptoms include poor emergence and root development, yellowing, discoloured roots and lesions on the root or stem tissue near the soil line.

Disease risks in soybeans that may be reduced by a fungicide seed treatment.

PYTHIUM SPP., RHIZOCTONIA SOLANI, FUSARIUM SPP.

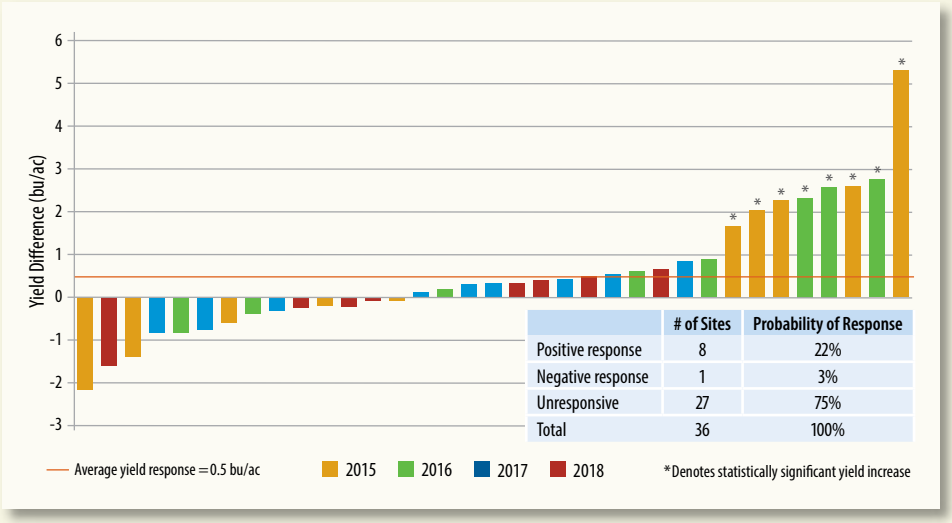
Risk Factors	Things to Consider
• Moist to wet soil. • Cold soil is conducive to *Pythium spp.* • Warm soil is conducive to *Rhizoctonia solani* and *Fusarium spp.*	• Roots must be examined to help distinguish between these diseases. Pathogens should be confirmed by laboratory testing. • Soybeans are most susceptible to these pathogens during the early V-stages.

PHYTOPHTHORA ROOT ROT (*PHYTOPHTHORA SOJAE*)

Risk Factors	Things to Consider
• Warm, wet soil. • Frequent soybean production throughout the crop rotation cycle. • Susceptible varieties.	• Soybeans are susceptible to PRR at any growth stage. • Resistance genes are available for PRR races 4, 3, 25 and 28. Consult the *Pulse and Soybean Variety Evaluation Guide* or *Seed Manitoba* for resistant varieties. • PRR may be distinguished from other root rots by disease progression from the roots upward and wilted leaves remaining attached to the plant (see left).

On-Farm Network Research Highlights

WHILE THERE ARE proven scouting techniques and economic thresholds for several foliar pests, farmers have very few tools to estimate risk from soil-borne pests. As a result, seed treatments are frequently applied on a just-in-case basis with little knowledge of the risk soil-borne pests actually pose to a given crop. With the cost of common seed treatments ranging from $6–18/ac, optimizing the seed treatment decision would be a positive step toward profitable and sustainable soybean production.



	# of Sites	Probability of Response
Positive response	8	22%
Negative response	1	3%
Unresponsive	27	75%
Total	36	100%

Thirty-six On-Farm Network soybean field trials were established in Manitoba comparing treated versus untreated seed. Seed treatments consisted of either fungicide + insecticide or fungicide alone. The objective of these trials were to examine the decision to treat seed versus planting untreated seed when armed with minimal knowledge of the risk from soil-borne pests. Over the last four years, applying seed treatments as a form of self-insurance prevented yield loss 22% of the time. There was no specific factor (seeding date, crop establishment, previous crop) that corresponded to the sites with a positive economic response.

This research is on-going and the latest results will be made available with MPSG's updated *Seed Treatment Risk Assessment* to be released later this year.

To view individual trial reports for these trials, visit manitobapulse.ca/on-farm-network. The use of seed treatments should be evaluated on a field-by-field basis, considering the risk factors that would warrant a seed treatment. ■

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WE KNOW BEANS

Preliminary Results of Potassium Management of Soybean Production in Manitoba

Megan Bourns, MSc Candidate, Department of Soil Science, University of Manitoba

HISTORICALLY, POTASSIUM FERTILITY may not have been at the forefront of a typical Manitoba farmer's nutrient management concerns given the extent of K-rich clays in the province. However, potassium fertility management is, and will continue to become, demanding of attention – and soybean production has a lot to do with this.

In Manitoba in recent years, there has been a very large and rapid expansion in soybean acres. In fact, soybean now occupies more than a quarter of the province's annual crop land. This expansion, coupled with soybean's high K removal rates in the grain at harvest (1.1–1.4 lb K_2O/bu), has changed the total amount of K being removed from Manitoba soils over time. There has been a large increase in the last several years, and most of that increase is accounted for by the change in soybean acres (Figure 1). The expansion in acres, high K removal rates and increasing genetic yield potentials likely explain the increase in incidence of K deficiency symptoms in soybeans in recent years, especially as production expands into lighter textured soils that are inherently low in potassium.

According to the *Manitoba Soil Fertility Guide*, current soybean K fertility recommendations are identical to those for crops such as spring wheat and canola – both of which do not remove K to the same extent as soybean crops (Table 1). In addition, these thresholds and rates are lower than what is currently recommended in neighbouring soybean producing areas such as North Dakota, Minnesota and Ontario. With the growing prevalence of soybeans in Manitoba's crop rotations, the increase in incidence of K deficiency symptoms in soybeans and the lack of comprehensive historical research for soybean K fertility in the province, it was time to reassess and update these recommendations.

Table 1. Current potassium fertility recommendations for soybean production according to the *Manitoba Soil Fertility Guide*.

Ammonium Acetate Soil Test K level	Recommendation
>100 ppm	No additional K
50 – 75 ppm	33 kg K_2O/ha broadcast and incorporated
<25 ppm	66 kg K_2O/ha broadcast and incorporated

The objectives of this two-year K fertility project were to determine the frequency of yield response to added potassium fertilizer across a range of soil test K (STK) levels, and to assess the effectiveness of different potassium fertilizer rate and placement combinations as a means to improve soybean seed yield. In order to achieve these objectives, two sets of trials were established: one set in field-scale on-farm trials and the other in intensively-managed small-plot trials.

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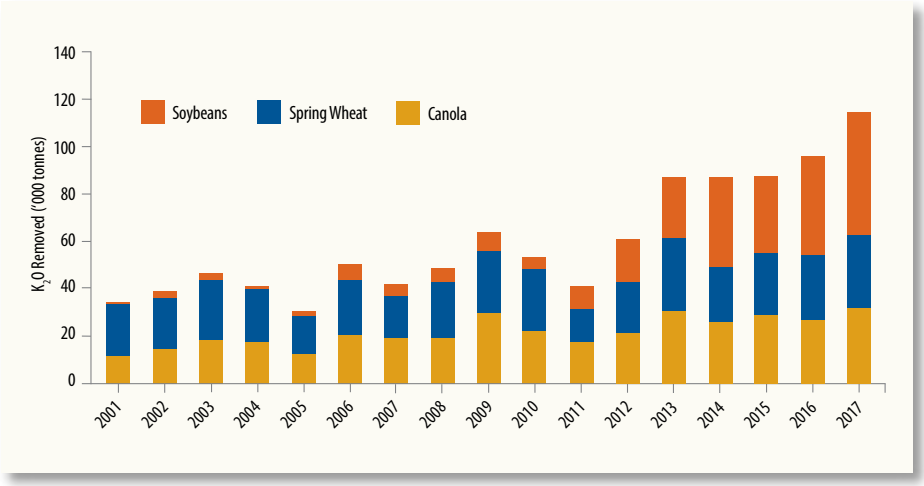
Figure 1. Change in annual K_2O removal over time in Manitoba.



ON-FARM TRIALS – STK AND FREQUENCY OF YIELD RESPONSE

The on-farm trials were established in conjunction with MPSG's On-Farm Network to characterize yield response across a range of STK levels. In total, 20 site-years were established with background ammonium acetate exchangeable STK levels ranging from 52–235 ppm. Each site was a replicated strip trial with one treatment of either 60 lb K_2O/ac banded away from the seed, or 120 lb K_2O/ac broadcast and incorporated. Treatment strips were randomized and replicated along with untreated control strips.

Three of 20 sites responded statistically significantly, two being yield increases and one a yield decrease (Figure 2). Only two significant positive responses were found. While one of these responses was at a site that had a background STK level less than 100 ppm, the current threshold for recommending an application of K fertilizer, the other was at a site that had well over this level of K in the soil. A higher frequency of response was expected, with more positive responses being anticipated at the sites that were at, or below, 100 ppm STK.

Preliminary Conclusions

Two sites showed a statistically significant yield increase in response to potassium fertilizer, and one site had a significant decrease in yield. The frequency of response and behaviour of responsiveness at individual sites was not as predicted based on background ammonium acetate soil test K levels. No agronomically, or statistically significant relationship was found between background ammonium acetate K levels and relative yield.

SMALL-PLOT TRIALS – EFFECTIVENESS OF K RATE AND PLACEMENT

Small-plot trials were established in commercial fields, with seven site-years in total. At these sites, less than 100 ppm background STK level was desired to increase the likelihood of K responsiveness. The small-plot trials compared six combinations of K rate and placement: 30 or 60 lb K_2O/ac sidebanded and 30, 60 or 120 lb K_2O/ac broadcast and incorporated, as well as a control with no added K.

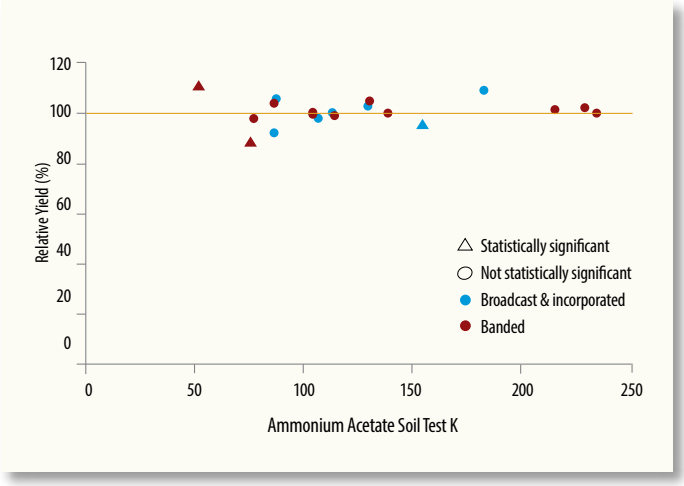


Figure 2. On-farm trial relative yield in relationship to background ammonium acetate soil test K levels.

Deficiency symptoms were observed throughout the season at multiple locations in both 2017 and 2018. Early season deficiency symptoms showed at some locations at V2–V3 stage (Figure 3a). Symptoms were also identified at seed fill, and in some cases these symptoms persisted to leaf drop (Figure 3b). This indicated that the sites were, in fact, low in K. However, at harvest no significant yield responses were found to any treatment at any site. The lack of yield response was surprising, especially given the low background STK levels at these sites, and the presence of deficiency symptoms.

There was no agronomically or statistically meaningful relationship found between background ammonium acetate STK and relative yield regardless of placement and rate. No meaningful relationship between background levels and yield were identified regardless of method of ammonium acetate extraction, on a moist or dry basis.

Preliminary Conclusions

Optimum rate and placement of potassium fertilizer could not be determined as there was no yield response to added K. No statistically significant, or agronomically meaningful, relationship was found between background ammonium acetate STK levels and relative yield. Tissue data, seed oil and protein, and seed K concentration will be further analyzed

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Figure 3. Potassium deficiency symptoms at V2–V3 (a) and R6 (b).

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in the coming months. In addition, a chemical study will be carried out to better understand K retention and release from these sites.

CHALLENGES FOR MEASURING SOYBEAN RESPONSE TO K FERTILIZER RATE AND PLACEMENT

There were three major challenges encountered that could have influenced the ability to detect differences in yield as a result of K treatments. Both 2017 and 2018 field seasons were very dry, the effects of which were definitely noticeable in the light-textured sandy soils where the small-plot sites were established. If moisture was the greatest yield-limiting factor, and full yield potential was not being achieved, then the demand for K may not have been as high.

Another challenge was the variability across the sites, which operated at a very small spatial scale (Figure 4). The differences in soil test potassium from one location to another across a site area were much greater than anticipated. The lack of consistency that results from this variability also influenced the ability to detect yield effects of the K fertilizer treatments.

Figure 4. K variability across the Long Plain 2018 site.

Lastly, ammonium acetate soil test K was not a reliable indicator of potassium response. The ammonium acetate test for exchangeable potassium was relied on to select sites that were likely to be responsive to potassium addition, based on current threshold levels from the *Manitoba Soil Fertility Guide*. However, potassium responsiveness was not accurately predicted based on the spring background ammonium acetate potassium levels at these small-plot sites. ■

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Integrated Weed Management (IWM) in Narrow-Row Dry Beans

Katherine Stanley and Dr. Martin Entz, Department of Plant Science, University of Manitoba

MANAGING WEEDS IN dry beans can present challenges due to their uncompetitive nature relative to other crops. Dry beans have been traditionally grown on wide rows to allow for row-crop cultivation, however, some farmers have begun to grow dry beans in solid-seeded production systems; in narrow rows, which requires a change in weed management strategy. When planted in narrow rows, beans are not as close together in the row, which can reduce crop competition with weeds. While this is somewhat accounted for by increasing seeding rate, weeds remain competitive and there are limited herbicides available for dry bean production. Relying solely on herbicides for weed control can accelerate the development of herbicide-resistant weeds, compromising the long term suitability of dry beans for narrow-row crop production.

Diversifying weed management tools to create an integrated weed management strategy is important to slow the rate of development of herbicide-resistant weeds, and to maintain an economically viable production system in the long term. Utilizing mechanical and cultural weed control methods, to complement herbicidal weed control can help to achieve this. Recently, new mechanical weed control technology such as the camera-guided inter-row cultivator (Figure 1a) and the rotative weeder (Einbock Aerostar rotation Figure 1b) have been introduced to the Canadian prairies. There is potential for these tools to be integrated into narrow-row crop production systems, reducing herbicide application during the growing season.

This study, carried out in 2018, evaluated the use of these tools integrated with herbicidal weed control in narrow-row navy beans, pinto beans and black beans. Preliminary data from the pinto bean study is discussed in this article.

Figure 1: New mechanical weed control technology being tested on dry beans planted on six-inch rows. (a) Camera-guided inter-row cultivator (b) Einbock Aerostar Rotative Harrow.

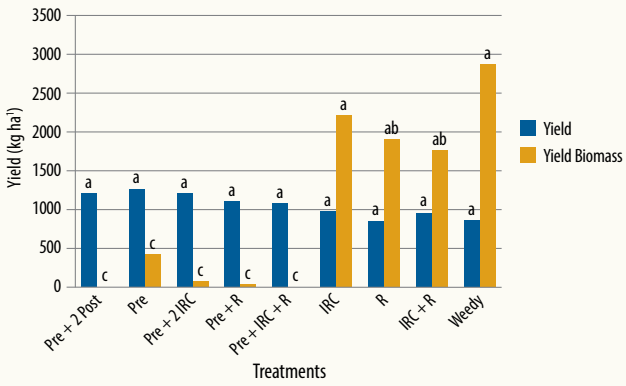

Figure 2: The effect of weed management treatments on yield (kg ha^{-1}) and weed biomass (kg ha^{-1}).

Pre = pre-emergent, Post = post-emergent, IRC = inter-row cultivation, R = rotative weeder. Different letters indicate significant differences between treatments at $P < 0.05$.

Windbreaker pinto beans were sown on six-inch rows to a recommended target plant population of 89,000 plants/ac (22 plants/m^2). Shown in Figure 2, treatments included:

1. Full herbicide control (full) that consisted of a pre-emergent application of Edge, and two in-crop applications
2. Pre-emergent herbicide only (Pre)
3. Inter-row cultivation (IRC)
4. Rotative weeder (R)
5. IRC+R,
6. Pre + IRC
7. Pre + R
8. Pre + IRC + R
9. Weedy control

Mechanical weed control timings were applied at the best known timing based on crop and weed staging.

The first year of this study in pinto beans provided interesting insight into the competitive ability of this bean type. Treatments without herbicide had significantly higher weed biomass than treatments that included a herbicide application. There was no significant difference in weed biomass between reduced and full herbicide treatments. The similarities in weed pressure between a full herbicide treatment, and only pre-emergent was also observed in the field (Figure 3).

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Figure 3: Pre-emergent herbicide only (left) and pre-emergent plus two post-emergent herbicide applications (right).

Figure 4: Pinto beans after rotative weeding + inter-row cultivation (left) compared to a weedy control (right).

While there was a slight yield decrease in treatments with no herbicide, this was not significant, despite the higher weed biomass in these treatments (Figure 2). This was also true for the weedy control treatment, despite the fact that the high weed pressure was evident in the field (Figure 4). This would suggest that pinto beans may have a high level of tolerance to weed competition in the field.

The large amount of weed biomass in the mechanical weed control treatments may suggest that weed management needs to occur earlier than when it was applied in this study. The rotative weeder treatments were applied around the unifoliate stage, however having a pre-emergent mechanical weed control treatment, or applying the rotation earlier after emergence may have had better control of weeds while they were still in the white thread stage.

The inter-row cultivator had excellent control of weeds in between the crop rows, however the weeds remaining in the crop row were competitive throughout the remainder of the season. Experimenting with this equipment on slightly wider rows, allowing for more crop plants in the row may increase the competitive ability of the crop, and allow for the use of other tools on the inter-row cultivator such as finger weeders, which will weed right in the crop row (Figure 5).

Despite non-significant yield loss of pinto beans under intense weed pressure, the remaining weeds could cause issues in future crops through contributions to the weed seedbank. Controlling weed seed return through cutting weeds above the crop, either with a swather or novel tools such as the CombCut (Figure 6), may provide opportunities to give the crop more access to light, filling in the canopy and reducing weed seed return to the seedbank.

There are many opportunities to develop integrated weed management strategies. Understanding the utility of the various mechanical tools in addition to cultural and herbicidal weed control will be important to build robust cropping systems that will continue to be profitable in to the future. ■

Figure 5: Finger weeders on the inter-row cultivator.

Photo credit: Sutton Ag

Figure 6: Machines like the CombCut will cut the stems of weeds, slowing their growth and removing seed-producing portions of the plant.


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Faba Bean Yield and Nutrient Uptake in Saskatchewan Soil

Serena Klippenstein, MSc Candidate, Department of Soil Science, University of Saskatchewan

FABA BEANS ARE grown both for grain and as a green manure rotational crop in Saskatchewan, however there is little recent information on nutrient requirements of modern faba bean cultivars grown under prairie conditions. As legumes can obtain much of the nitrogen (N) they need from the air through biological nitrogen fixation (BNF) in the nodules on their roots, knowing the contribution of BNF in pulse crops like faba beans is important when selecting crops to use in rotation that can help maintain soil N fertility. Not only must nutrient requirements be met for a target faba bean crop yield, but nutrients removed by faba bean harvest should be accounted for to maintain fertility for successive cropping years. To address this need, a recent collaborative study at the University of Saskatchewan in the Soil Science Department and the Crop Development Centre looked at faba bean yield, nutrient uptake and removal over two years at four sites in the Dark Brown, Black and Gray soil zones. The study was funded by the Saskatchewan Pulse Growers and the Saskatchewan Agriculture Development Fund.

FIELD STUDY

Four zero-tannin faba bean cultivars, two small-seed (CDC Snowdrop, 219-16) and two large-seed (Snowbird, Tabasco), were grown and analyzed in a two-year field study (2016 and 2017) in Saskatchewan. The effect of different environmental conditions and soil types were considered by utilizing four different field site locations each year (Meath Park, Rosthern, Saskatoon and Outlook, SK) (Figure 1) in different soil-climatic zones and in conditions where faba beans are normally grown in Saskatchewan. Two different fertilizer treatments, unfertilized and fertilized with potassium sulfate (K_2SO_4) (0-0-44-17) and monoammonium phosphate (MAP) (11-52-0), were applied to each of the four site locations. Analysis of grain and straw biomass and nutrient concentration was used to determine yield, uptake and removal of soil macro- and micro-nutrients, and to estimate BNF by different cultivars.

YIELD

Faba bean showed good yield potential. Average unfertilized and fertilized faba bean grain yields for the four cultivars were between 2,700 lb/ac and 6,200 lb/ac (3,000 to 7,000 kg/ha) at the four field site locations in 2016 and the three field site locations in 2017 (Figure 2). Overall average faba bean grain yield in the two site-years was 4,707 lb/ac (5,283 kg/ha) and ranged from 872–8,720 lb/ac (979–9,787 kg/ha).

Note: *Yields in this study were determined by hand harvesting, which typically results in higher yield values than harvest of the same site with a combine harvester.*

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Figure 1. The four field study site locations in Saskatchewan, (A) Meath Park, (B) Rosthern, (C) Saskatoon, (D) Outlook (Government of Saskatchewan, 2009).

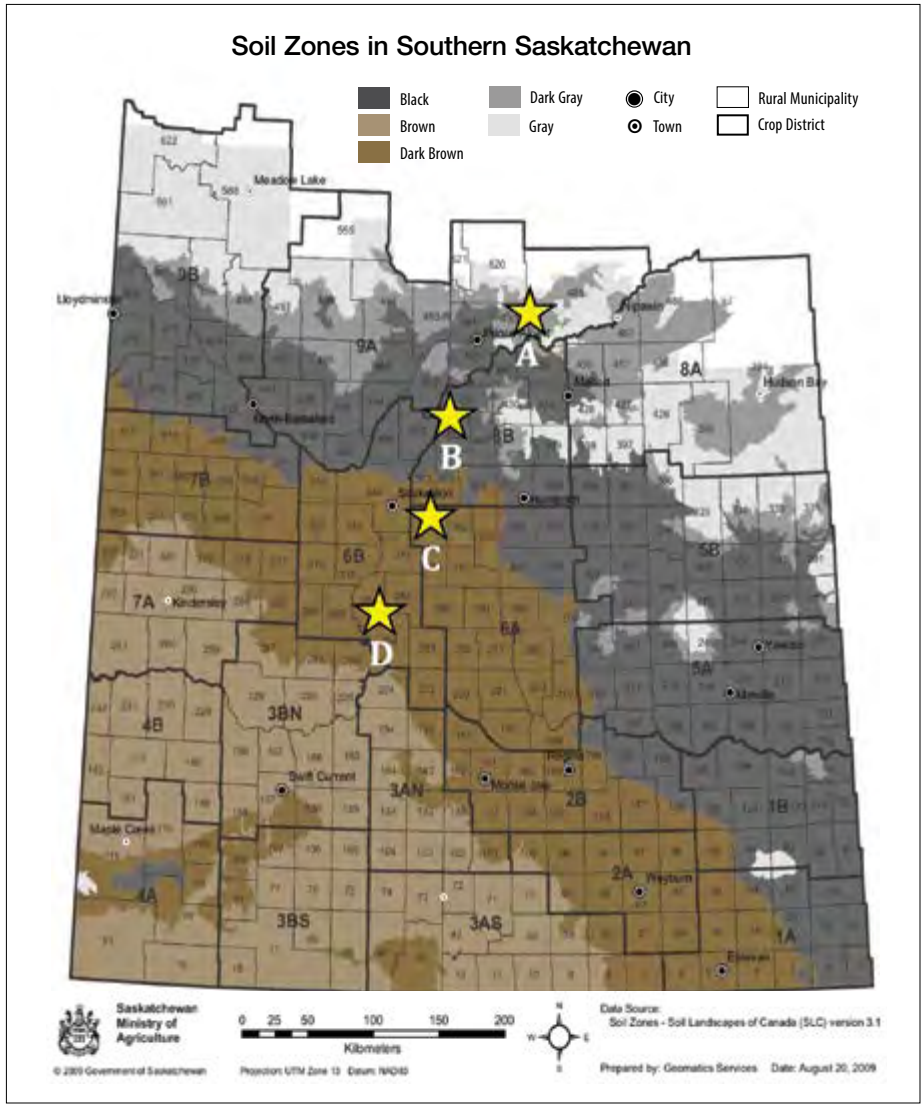
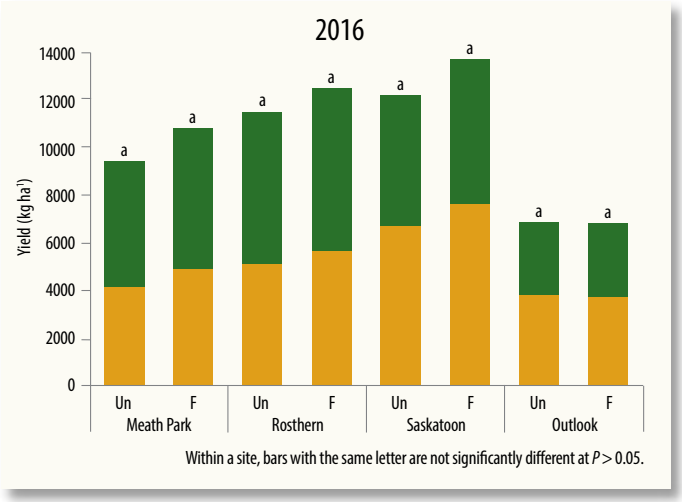
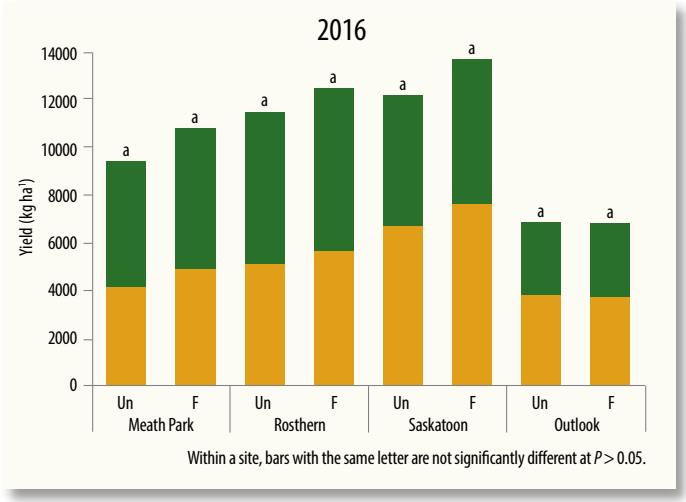


Figure 2. Straw (yellow) and grain (green) yield (n = 4) of faba beans in this study. Unfertilized (Un) and fertilized (F) treatments are indicated.





Compared to other site locations, yields were lowest at Outlook due to adverse growing conditions in 2016, and the site was lost to hail in 2017. Compared to other cultivars, Snowbird had the lowest mean total (grain + straw) yield in 2016 and 2017 and the lowest average grain yield in 2017, but the greatest grain yield of all the cultivars in 2016. It was clear from the field results that soil and environmental factors, as well as cultivar, had a profound influence on the faba bean yield components.

HARVEST INDEX

Partitioning of yield between faba bean grain and straw, and therefore harvest index (grain yield/grain+straw yield), differed with site location and cultivar each year. However, grain yield was greater than straw yield in both unfertilized and fertilized treatments in 2016 and 2017. Average harvest index (HI) of faba bean ranged from 45–56% in 2016 and 2017, with the highest average HI at Rosthern (56% in 2016; 53% in 2017) and the lowest average HI at Saskatoon (45% in 2016; 50% in 2017) in both years. Lower HI at Saskatoon and Outlook likely reflected impacts of drier summer conditions. The Snowbird cultivar had a significantly greater HI than the other cultivars at most site locations in 2016 and, along with 219-16 and Tabasco, had a significantly greater HI than CDC Snowdrop at Rosthern and Saskatoon in 2017.

NITROGEN AND PHOSPHORUS UPTAKE

In 2016 and 2017, average faba bean total (grain+straw) nitrogen (N) uptake was 205 lb N/ac (230 kg N/ha), with

Serena Klippenstein with faba bean field study plots in Saskatoon, August 2017.

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Faba bean field study plots in Saskatoon, July 2017.

grain N uptake and removal in harvest ranging from 104–267 lb N/ac (117–300 kg N/ha). The high yield potential of faba bean is associated with significant external contribution of N from BNF. Average faba bean total (grain+straw) phosphorus (P) uptake was 24 lb P/ac (27 kg P/ha), with grain P uptake and removal in harvest ranging from ~13–31 lb P/ac (~15–35 kg P/ha) or 30–71 lb P_2O_5/ac (34–80 kg P_2O_5/ha). Grain P removal was similar to the reported P removal by faba bean grain according to the Canadian Fertilizer Institute (2001) and Saskatchewan Pulse Growers (SPG; 2018), for a 50 bu/ac (3,800 kg/ha) faba bean yield, which falls within the range of the current study. As expected, the majority of above-ground N and P uptake was found in faba bean grain for both fertilizer treatments in all cultivars across all site locations in both field study years as revealed in the uptake harvest indices.

CONCLUSIONS

Yield – Faba bean has high yield potential, with significant external contribution of N coming from biological nitrogen fixation, which can help maintain soil N fertility.

Nutrient partitioning – Nutrient partitioning among grain and straw greatly favours grain, with large amounts of N and P being removed in the seed at harvest.

Fertility – Faba bean yield components showed limited response to fertilization at the four sites in this study, but fertility management in rotations with faba bean will need to consider drawdown over the long-term, as most of the P taken up was found in grain.

Controlling factors – Soil and environment are major controlling factors and faba bean yield and N and P uptake vary with location and conditions. ■

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Validating Soybean Seeding Rate Recommendations with the On-Farm Network

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SOYBEAN SEEDING RATES were explored by the MPSG On-Farm Network in 2018 at 15 on-farm trial locations across Manitoba. Farmers compared 190,000 seeds/ac, 160,000 seeds/ac and 130,000 seeds/ac replicated and randomized four times in these trials. Seeding equipment, soybean varieties, planting dates, crop history and management varied for all on-farm trials and are reflective of farmers' normal soybean management practices.

The average achieved plant stand in the field for each farm is expressed as % survivability of each seeding rate. Average survivability of 190,000, 160,000 and 130,000 seeds/ac across farms were 87, 82 and 81%, respectively, when assessed at V1. This equates to 156,000, 130,000, and 113,000 plants/ac, respectively.

There was no significant treatment by site-year interaction observed for soybean yield in 2018. This means that the relationship between seeding rates did not change across farms. When averaged across all farms, there was no significant yield difference between 190,000 and 160,000 seeds/ac. However, 130,000 seeds/ac was significantly lower than the other two seeding rates by a modest 0.6 bu/ac (Figure 1).

The lack of yield response between 190,000 and 160,000 seeds/ac is not surprising. Economically optimum plant stands most often range from 140,000 to 160,000 live plants/ac, according to recent small-plot research conducted in Manitoba. In this experiment, a seeding rate of 190,000 seeds/ac resulted in a plant population that was within this recommended range and 160,000 seeds/ac fell just below this range. However, the plant population established by 130,000 seeds/ac fell well below this range, resulting in a statistically significant yield reduction.

When determining your own seeding rate, economic factors must be considered. For example, lets assume the cost of one unit of soybeans (140,000 seeds/ac) to be $55/unit, and the current market price for soybean to be $10/bu. Based on these estimates, the cost to increase from 130,000 to 160,000 seeds/ac would be $11.78/ac. The break-even yield difference needed to cover the extra cost of soybean seed is 1.2 bu/ac, double what was observed within this trial. However, before cutting seeding rates it's important to consider the agronomic implications of doing so.

It may be enticing to save money by cutting costs on soybean seed. But you may first want to consider factors that can reduce plant stand. This may include pest pressure and adverse growing conditions. A strong plant stand can maintain yield potential throughout the growing season, despite the loss of plants to disease or insect pressure, adverse weather or other abiotic factors.

Higher seeding rates that establish recommended plant stands may also afford your crop the ability to compete against weeds. Research has shown that both higher seeding rates and narrower rows have increased soybean competitive ability against weeds.

Looking at long-term production on your farm, there could be negative impacts from cutting your seeding rate. University of Manitoba researchers have pointed to the long-term risk of reduced soybean seeding rates contributing to the further spread of herbicide-resistant weed populations. Adequate seeding rates and other cultural weed management controls enhance the effect of herbicides, providing more complete weed control and preventing weed escapes. Therefore, before cutting your investment in seed consider the weediness of the field, your row spacing and the overall environmental conditions the crop is likely to experience. ■

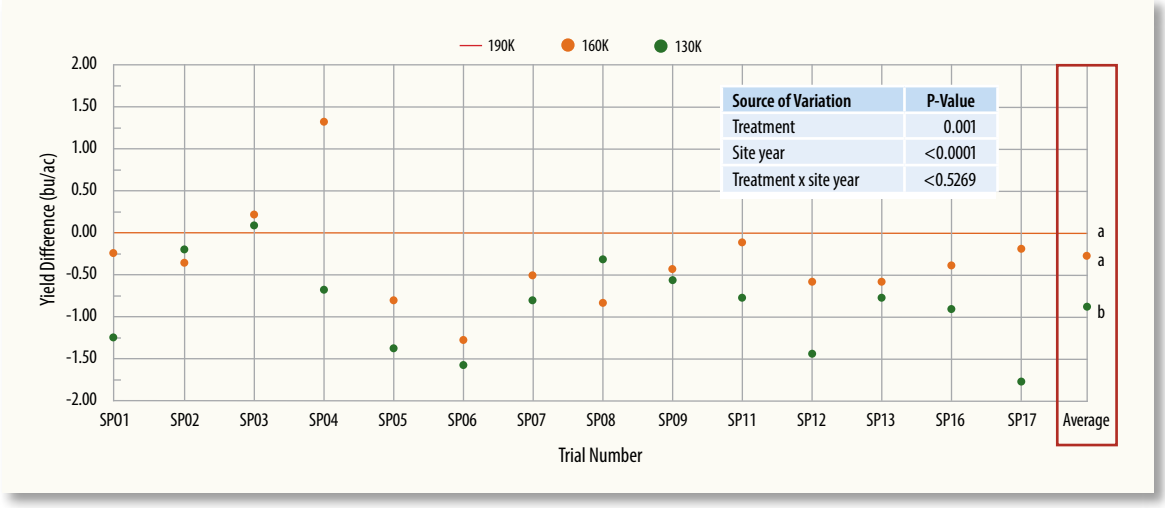

Figure 1: Yield difference for 160,000 seeds/ac and 130,000 seeds/ac relative to 190,000 seeds/ac.

Minimizing Air Seeder Damage

Lorne Grieger, Prairie Agricultural Machinery Institute

A RECENT PAMI study has produced results of particular interest to soybean farmers: the lower the moisture content of the seed, the more likely it is to suffer damage during air seeding. Carried out in the summer and fall of 2017 with air seeders in use by Manitoba farmers, the testing examined the effect of various fan speeds on seed distribution and seed coat damage to three crops: canola (small), wheat (medium) and soybeans (large).

This study had many variables, including soybeans that had different moisture content levels. Soybeans used in this research had moisture contents of 8, 10 and 13 percent, and the low-moisture seeds suffered the most damage. There was only a marginal difference in the damage when seeding was done using low, medium and high fan speeds.

The purpose of this study was to evaluate the consistency of distribution in large air seeders (60 feet in width) and the effect of fan speed on distribution and seed damage. Two configurations of 60-foot seeders (Bourgault and John Deere) were chosen for analysis due to their popularity in Manitoba (Figures 1 and 2). Both air seeders were owned by local farmers and used over six to seven seeding seasons. Some modifications to the air seeder distribution system and hoses were made by the owners over time. Because the systems tested were used, new equipment may produce different results.

Seeding setups (used machines) were provided by cooperating farmers and tests were performed in farmer's yard sites. All equipment was assessed for quality and function prior to testing, and parts showing excessive wear were replaced. Three fan speeds were tested for each seed type: the lowest recommended by the manufacturer, as well as 15% and up to 30% higher RPM. Seeding was simulated at a five mph ground speed in a stationary setup with the openers in an up position and with product rates as recommended by local commodity groups. Seed was collected from individual openers after each repetition and its location recorded. Trials with wheat and canola included fertilizer rates suggested by their respective commodity groups. Each seeder underwent 45 tests (three fan speeds, five seed sets, three replications of each).

SEED GERMINATION RESULTS

The overall effect of moisture content was pronounced. The highest germination rates occurred when seeds had higher moisture and were seeded at lower fan speeds (Table 1). Soybeans at 8% moisture had a lower rates of germination than 13% moisture soybeans by 4.6% and 3.0% in the Bourgault and John Deere trials, respectively.

Fan speed did not have an effect on germination in the John Deere trials, but lower fan speed resulted in higher

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Table 1. Average germination rate (%) for soybeans at three different moisture contents and fan speeds compared with canola and wheat.

	Average Rate of Germination (%)			
	Fan Speed			
Commodity	Low	Medium	High	Average
Canola	96.4	96.0	95.2	95.9
Wheat	95.4	93.8	93.0	94.1
Soybeans	–	–	–	–
8%	94.5	91.7	94.0	93.4
10%	96.8	95.8	92.4	95.0
13%	96.6	96.5	97.8	97.0
Average	95.9	94.8	94.5	–

Figure 1. Bourgault set-up with locations of secondary manifolds.

Figure 2. John Deere set-up with locations of secondary manifolds.

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germination in the Bourgault trials for soybeans. Fan speed had no effect on germination for smaller-seeded canola or wheat. Combining results across trials, higher moisture soybeans were shown to have higher germination than lower moisture soybeans. This indicates that in practice, lower fan speeds and higher moisture soybeans should be used where possible to reduce seed damage.

SOAK TESTING RESULTS

Additionally, soak testing (swollen seed count) was performed to analyze the potential difference in quality of the seeds collected at the openers for one of the air seeders. Swollen seeds are seeds with a damaged seed coat and therefore, may not contribute to stand development in the field. Seed damage is assessed based on swollen seed count; with higher a count indicating increased seed coat damage.

All three moisture contents were significantly different from each other. This is shown in Figure 3 where the middle horizontal line of each box represents the average swollen seed count for each moisture content. Soybean seeds with 13% moisture performed significantly better than seeds with 8 and 10% moisture. Seeds with 8% moisture showed significantly higher seed coat damage among the three seed moisture conditions used in the test.

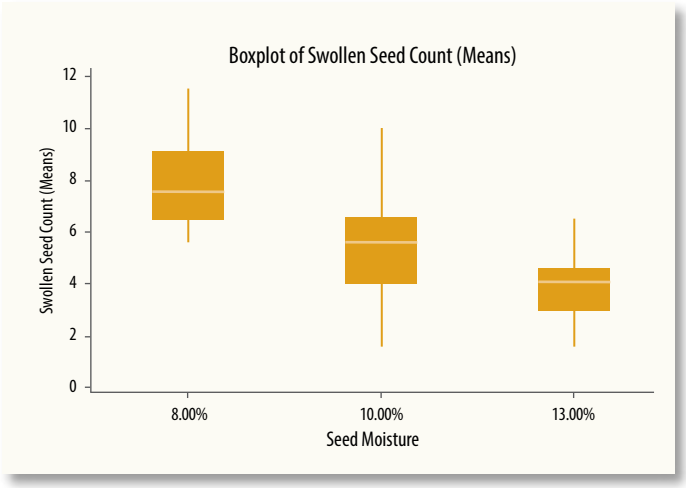


Figure 3. Seed moisture effect on average swollen seed count (an indicator of damaged seed coats).

The effects of fan speed and manifold position on the swollen seed results were not statistically significant.

VARIATION

Variation was measured by the coefficient of variation (CV_2), expressed as a percent across the width of the air seeders. The CV_2 was between 11–20% for all trials with the highest variation occurring in canola. Results suggest that the position of the manifold could affect product distribution, as manifolds closer to the centre were more likely to receive larger volumes of product compared to manifolds near the extremes. However, no clear pattern in seed distribution was established. Manifold position was shown to have no significant effect on germination for wheat, and canola, or soybeans.

On any single opener, variation in delivered product between successive trials was relatively low (average of 4.9% over both seeders). From this information, higher fan speeds may increase variation for seeding soybeans, but may reduce variation with higher volumes of product such as with wheat and canola.

Air seeders are effective at seeding soybeans quickly and efficiently, and now, with the information generated from this study, the effect of seed moisture content can be accounted for. Farmers may want to consider increasing the amount of seed they put through in order to get the same number of viable seeds into the ground. ■

Soybean Scout ANSWERS

Photo: Dennis Lange, Manitoba Agriculture

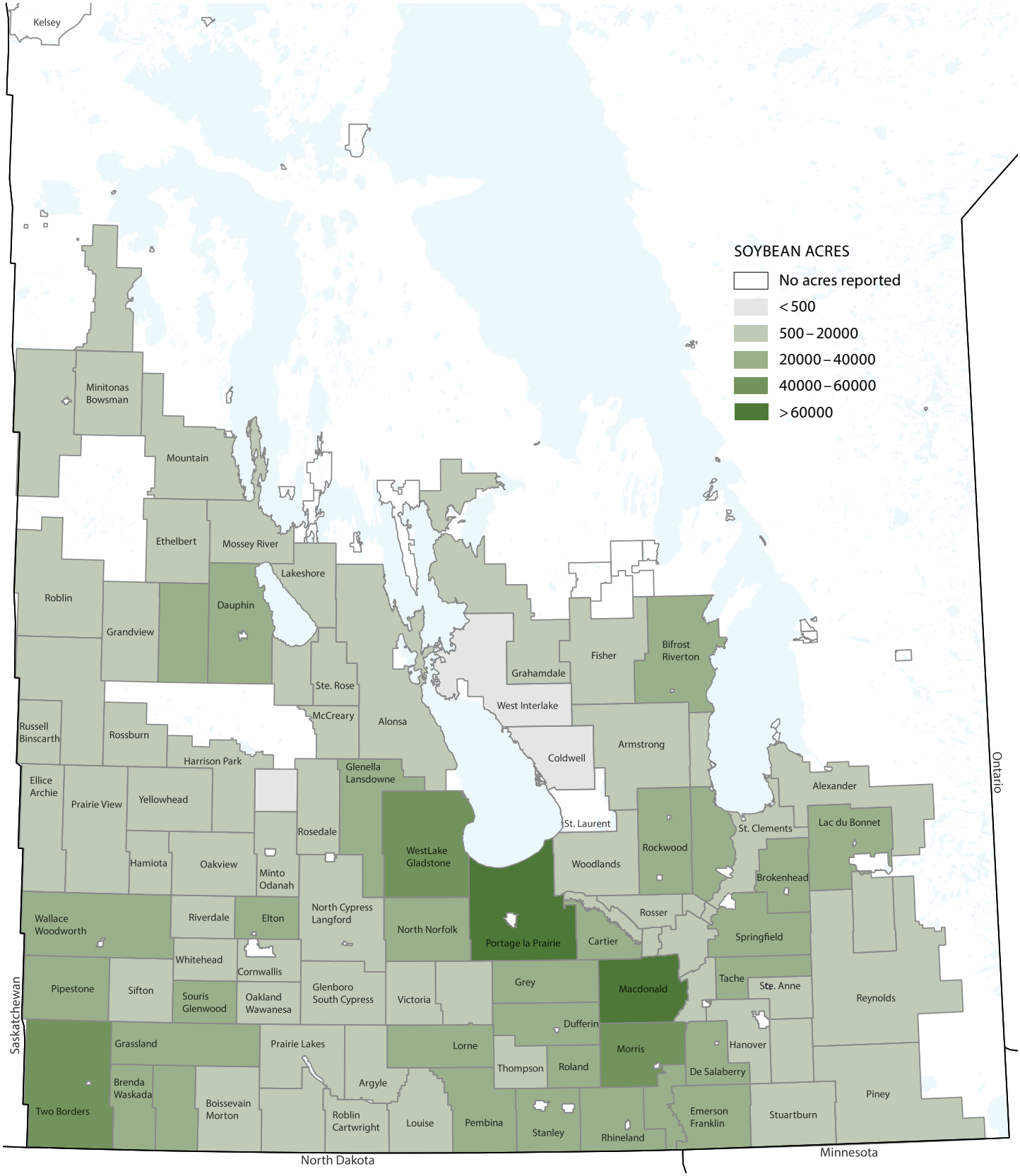
A – Bald Head

The term bald head refers to dry bean, soybean or field pea seedlings that are severely stunted due to damage or death of the growing point. In the case of dry beans and soybeans, loss of cotyledons is another sign of bald head. This condition is caused by physical damage to seeds during threshing, handling, cleaning or planting. Dry seed is most susceptible to this type of damage. The odd bald head seedling is common in most fields. However, the presence of 10–15% bald heads will influence plant stand quality.

B – Yellow Cotyledons

Yellow soybean cotyledons are a sign of seedling stress caused by deep seeding. Other symptoms include missing cotyledons and a swollen hypocotyl. It is currently recommended to plant soybeans at ½ to 1 ½ inches deep. During emergence, the soybean hypocotyl elongates in order to pull its cotyledons above the soil surface. If seeds are planted too deep, the seedling must put more energy into emergence causing stress symptoms. Soybeans with yellow cotyledons such as these should recover over time, although emergence may be delayed.

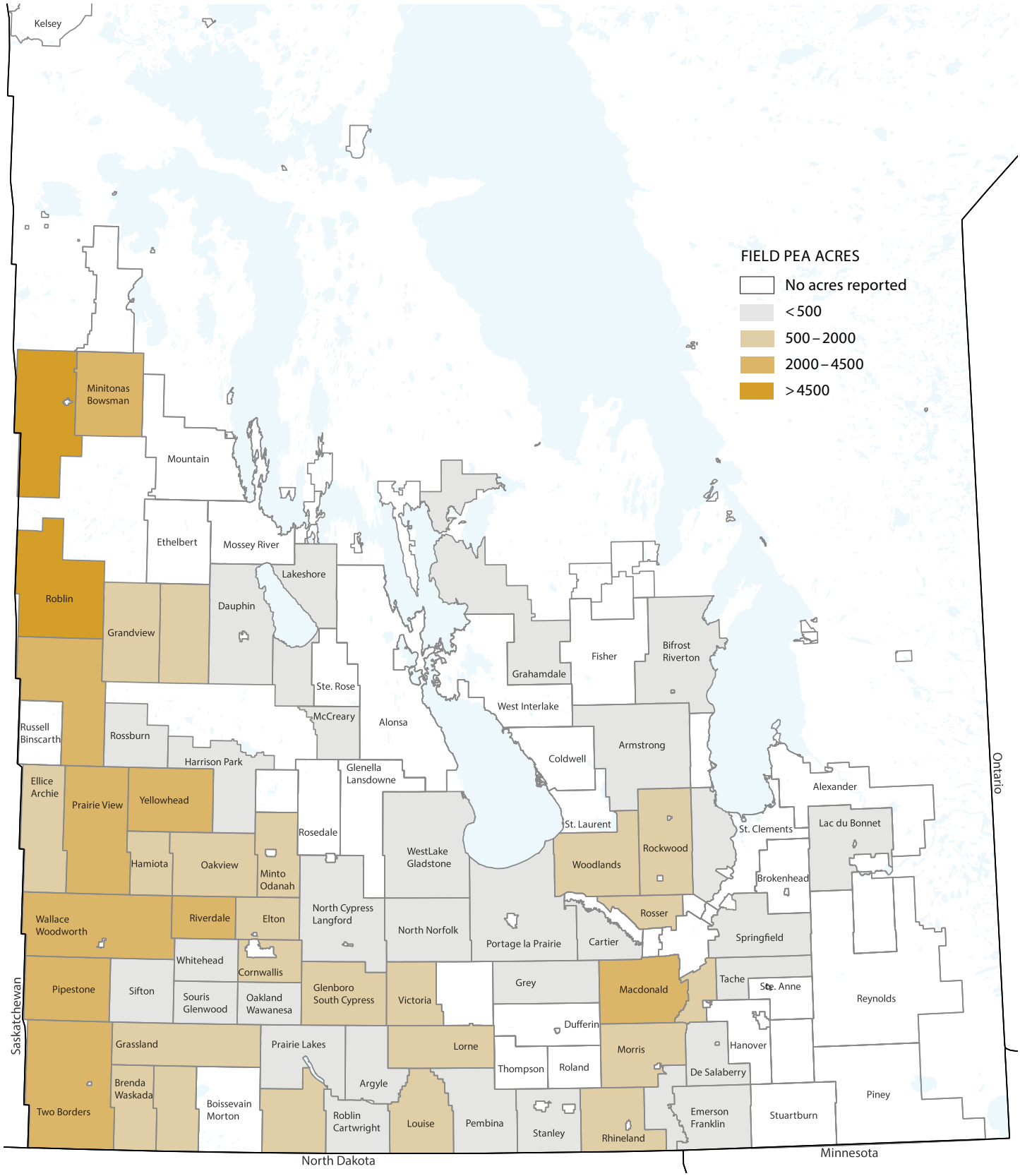
2018 Soybean Acres



MANITOBA Pulse Soybean GROWERS

MASC Manitoba Agricultural Services Corporation

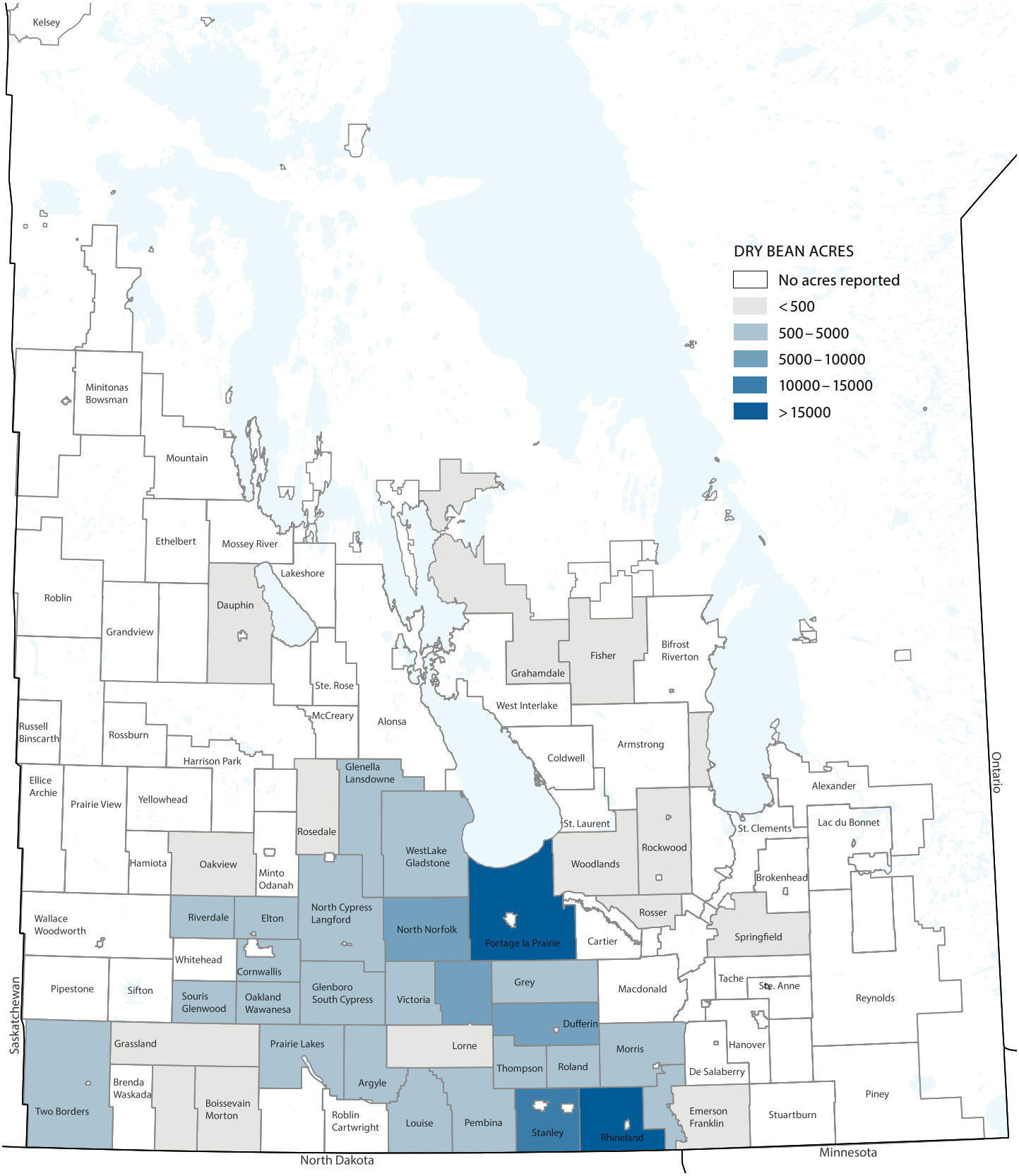
2018 Field Pea Acres



MANITOBA Pulse Soybean GROWERS

MASC Manitoba Agricultural Services Corporation

2018 Dry Bean Acres



MANITOBA Pulse Soybean GROWERS

MASC Manitoba Agricultural Services Corporation

Manitoba Pulse & Soybean Buyer List – February 2019

COMPANY	EDIBLE BEANS	FABA BEANS	LENTILS	PEAS	SOYBEANS	PHONE	LOCATION	CGC REGULATED
Agri-Tel Grain Ltd.				✓	✓	204-268-1415	Beausejour, MB	✓
AGT Foods	✓		✓	✓	✓	306-525-4490	Regina, SK	✓
• SaskCan Pulse Trading – Parent Division	✓		✓	✓	✓	204-737-2625	St. Joseph, MB	✓
All Commodities (AC) Trading Ltd.			✓	✓		204-339-8001	Winnipeg, MB	✓
B.P. & Sons Grain and Storage Inc.					✓	204-822-4815	Morden, MB	✓
Belle Pulses Ltd.				✓		306-423-5202	Bellevue, SK	✓
Besco Grain Ltd.	✓	✓	✓	✓	✓	204-745-3662	Carman, MB	✓
Best Cooking Pulses Inc.			✓	✓		204-857-4451	Portage la Prairie, MB	✓
Brett-Young Seeds				✓	✓	204-261-7932	Winnipeg, MB	
BroadGrain Commodities Inc.	✓	✓	✓	✓	✓	416-504-0070	Toronto, ON	✓
C.B. Constantini Ltd.				✓		604-669-1212	Vancouver, BC	✓
Canadian Grain Inc.	✓	✓	✓	✓	✓	905-257-6200	Oakville, ON	✓
Cargill Ltd.				✓	✓	204-947-6219	Winnipeg, MB	✓
Ceres Global Ag Corp.			✓	✓		306-988-4456	Oxbow, SK	✓
Columbia Grain Inc. (CGI) (Walhalla Bean Co.)	✓					701-549-3721	Walhalla, ND	✓
• Winkler Receiving	✓					204-325-0767	Winkler, MB	✓
Delmar Commodities Ltd.				✓	✓	204-331-3696	Winkler, MB	✓
Farmer Direct Co-operative Ltd.	✓	✓	✓	✓		306-352-2444	Regina, SK	
Fill-More Seeds Inc.			✓	✓		306-722-3353	Filmore, SK	✓
G3 Canada Limited				✓		204-983-0239	Winnipeg, MB	✓
Gavilon Grain LLC					✓	816-584-2210	Omaha, NB	✓
Global Grain Canada Ltd.	✓					204-829-3641	Plum Coulee, MB	✓
Hensall District Co-op	✓					204-295-3938	Winnipeg, MB	✓
Horizon Agro Inc.					✓	204-746-2026	Morris, MB	
ILTA Grain Inc.	✓	✓	✓	✓	✓	604-597-5060	Surrey, BC	✓
J.K. Milling Canada Ltd.				✓		306-862-5401	Regina, SK	✓
Johnson Seeds Ltd., S.S.	✓			✓		204-376-5228	Arborg, MB	✓
Knight Seeds			✓	✓		204-764-2450	Hamiota, MB	
Kalshea Commodities Inc.				✓		204-272-3773	Winnipeg, MB	✓
Linear Grain Inc.	✓			✓	✓	204-745-6747	Carman, MB	✓
Louis Dreyfus Company Canada ULC					✓	403-205-3322	Calgary, AB	✓
Marina Commodities Inc.			✓	✓		204-937-2300	Roblin, MB	✓
Masterfeeds				✓		403-327-2555	Lethbridge, AB	
Maviga NA., Inc.		✓	✓	✓		306-721-8900	Regina, SK	✓
Monsanto					✓	–	Winnipeg, MB	
Natural Proteins Inc.					✓	204-355-5040	Blumenort, MB	✓
North American Food Ingredients					✓	204-272-5510	Winnipeg, MB	✓
Nutri-Pea Ltd.				✓		204-239-5995	Portage la Prairie, MB	
Nu-Vision Commodities	✓					204-758-3401	St. Jean Baptiste, MB	
Parrish & Heimbecker Ltd.					✓	204-987-4320	Winnipeg, MB	✓
Paterson Grain				✓	✓	204-956-2090	Winnipeg, MB	✓
• FeedMax Corp.				✓		204-523-0682	Killarney, MB	✓
Providence Grain Group	✓	✓	✓	✓	✓	780-997-0211	Fort Saskatchewan, AB	✓
PS International, LLC DBA Seaboard Special Crops		✓	✓	✓		306-565-3934	Regina, SK	✓
Pipeline Foods, ULC				✓		204-997-2480	Winnipeg, MB	✓
Richardson International				✓		204-934-5627	Winnipeg, MB	✓
• Richardson Pioneer Ltd.				✓	✓	204-934-5627	Winnipeg, MB	✓
• Tri Lake Agri				✓		204-523-5380	Killarney, MB	✓
Scoular Canada Ltd.	✓	✓	✓	✓	✓	403-720-9050	Calgary, AB	✓
Seed-Ex Inc.		✓	✓		✓	204-737-2000	Letellier, MB	✓
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	✓
Sunrich LLC					✓	507-446-5642	Hope, MN	
Thompsons Limited	✓		✓	✓		519-676-5411	Blenheim, ON	✓
Vanderveen Commodity Services Ltd.				✓	✓	204-745-6444	Carman, MB	✓
Viterra Inc.	✓	✓	✓	✓	✓	Contact your local Viterra sales representative		✓
Wilbur Ellis Company of Canada Ltd.	✓		✓	✓		204-867-8163	Minnedosa, MB	✓
Zeghers Seeds Inc. o/a Zeghers Canada	✓			✓		204-526-2145	Holland, MB	✓

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 that do not purchase grain and feed mills do not have to be licensed. The pulse and soybean crop buyers listing includes only companies that are licensed and secured by the CGC (or exempted by regulation), and who are registered to submit check-off to MPSG. It is the responsibility of the farmer to ensure the company they are dealing with is reliable. Questions regarding licensing and security should be directed to the CGC at 1-800-853-6705 or 204-983-2770. To be included on MPSG's pulse and soybean crop buyers list, contact the MPSG office at 204-745-6488 for the buyers registration package.

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- Are you wondering if your inputs are providing a return on investment?

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on-farm network

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The On-Farm Network is a network of on-farm research related to pulse and soybean crops that is fully funded and directed by Manitoba Pulse & Soybean Growers (MPSG). All research in this network is based on three important principles:

1. **Participatory** – Conducted on your farm, involving you in the research process
2. **Precise** – Data produced is unbiased, accurate and robust
3. **Proactive** – Results delivered to guide management decisions and improve your farm's productivity and profitability

Benefits

As an On-Farm Network participant, you will benefit from producing results directly on your farm and applying the knowledge to guide management decisions that will increase your profitability. MPSG benefits by producing reliable results across a wide range of environments, allowing us to make robust production recommendations for Manitoba's pulse and soybean farmers.

Requirements of the Farmer

- Keep in contact with MPSG on timing of field operations and field records
- Be equipped with GPS technology
- Establish replicated strip trials comparing the treatments as outlined in the trial protocol
- Harvest strips into an MPSG weigh wagon or your own grain cart for accurate results
- Must be a member in good standing with MPSG

Responsibilities of MPSG

- Provide technical and logistical support
- Be present at trial establishment and harvest when needed
- Provide in-season data collection to support your results
- Provide the farmer with a single-page report of results
- Report data in a confidential manner that is not linked back to the farmer
- Minimize work for farmers

2019 TRIAL TOPIC IDEAS FOR PULSE AND SOYBEAN CROPS

- Seed Treatments
- Seeding Rates
- Row Spacings
- Inoculants
- Fertility
- Biologicals
- Fungicide
- Residue Management
- Field Rolling
- Intercropping

MANITOBA Pulse Soybean GROWERS

To participate in the trials, sign up at **www.manitobapulse.ca/on-farm-network**

For more information, please contact **Ian Kirby 204.751.0135 • ian@manitobapulse.ca**

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