MANITOBA PULSE & SOYBEAN GROWERS

pulsebeat

Issue 87 • Summer 2019

PM40016070

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Cover photo by MPSG

Publisher	Manitoba Pulse & Soybean Growers
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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

Sharpen Your Agronomy and Management Skills

SMART DAY

SOYBEAN MANAGEMENT & RESEARCH TRANSFER

Manitoba Pulse & Soybean Growers has a major investment in agronomic research projects, many of which are conducted at the University of Manitoba – Ian N. Morrison Research Farm. Attendees will tour research plots, learn how results can be applied to their farms and interact with researchers and extension specialists.

SAVE THE DATE

TUESDAY JULY 23

9:00 am – 3:00 pm

REGISTRATION 8:30 am | LUNCH PROVIDED

University of Manitoba – Ian N. Morrison Research Farm

Carman, MB –1.8 km west of the junction of Hwy 3 and 13

RESEARCH PROJECTS AND PRODUCTION QUESTIONS WILL INCLUDE

- **Integrated Weed Management for Soybeans and Mechanical Weed Control Tools**
- **Soybeans in Rotation: Agronomy and Economics**
- **Cover Crops in Manitoba**
- **Soybean Diseases and Frequency in Rotations**

PRE-REGISTRATION IS REQUIRED FOR ALL ATTENDEES

Register online | manitobapulse.ca

or contact Laura Schmidt at **204.751.0538**

Registration is free for farmer members in good standing with MPSG.

Agronomist/non-member fee is $50. *CCA CEU credits will be available.*

Manitoba Pulse & Soybean Growers 2019 Committees and Representatives

MPSG COMMITTEES – *The first named is chair*

Executive – C. Penner, M. Rattai, E. Sirski, J. Preun (non-voting), 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, S. Klippenstein, M. Bourns, industry advisors

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

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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** – B. Dalgarno (MPSG) (exp. 2023)
- **CGC Western Grain Standards Committee** – E. Sirski (exp. 2021)

Message from Board Chair

Calvin Penner, Chair

IN FEBRUARY, I was nominated for the position of Chair of Manitoba Pulse & Soybean Growers (MPSG). I accepted.

It's an honour to serve on such a great board of directors and I am humbled by the hard work of outgoing Chair John Preun and retiring board member Rick Vaags, both of whom were instrumental in building a solid organization and helping the pulse and soybean industry strengthen.

As MPSG celebrates its 35th anniversary this year, I would like to acknowledge the dedication of all previous staff and board members. The association has seen a lot of change—a lot of growth—since it formed. And our upward trajectory is due to strong leadership in and out of the boardroom. Thanks!

I would also like to welcome Garrett Sawatzky to the MPSG Board of Directors. Garrett and his wife farm near Altona, MB and is an otherwise active person in the agricultural sector. He teaches farm management at the University of Manitoba and he's a Keystone Ag Producers delegate. Welcome, Garrett!

Staff and farmers are looking forward to the 2019 growing season. As I write this, it looks as though the soybean industry will face unique challenges related to pricing and trade.

We've noticed a decrease in soybean acres again this year, especially in swing areas that don't have as much experience growing the crop as others.

In the words of outgoing Chair John Preun, "Soybeans are here to stay."

We're still growing them on our farm and I choose to remain positive that the trade issues currently weakening the price for soybeans are going to get resolved or new markets will get discovered. Soy is still widely regarded as an excellent source of protein. And the world needs protein. I know Soy Canada is working hard to mend the situation.

It's encouraging to see pulse acres increase. There are quite a few edible bean acres represented on our board and those farmers should feel encouraged by the strong representation. We look forward to supporting our pulse farmers and doing what we can to see that those acres remain profitable and supported in a global marketplace. Our friends at Pulse Canada are a tremendous help on these matters. I encourage you to visit our website at manitobapulse.ca, but I would also suggest you take the time to visit pulsecanada.com and soycanada.ca.

Staff at MPSG are geared up and ready to help farmers with any issues they are having on their farms, as well as take your questions. We're here for you and I'd like to see you take advantage of that. MPSG continues to look for ways to improve pulse and soybean production in Manitoba, through continued research on ongoing and upcoming issues, events, field scouting and the generation of top-notch agronomic resources/extension materials.

The On-Farm Network is set for steady growth again, as more and more farmers are seeing the value in conducting research on their farms on issues relevant to their farms.

I'm looking at the long-range forecast calling for more late-summer moisture and I don't think I am alone in hoping for a wetter growing season. I'm choosing to remain positive.

MPSG continues to lend expertise and a listening ear to conversations surrounding the attraction of a local soybean crush facility. Staff and board are paying attention to this.

We're also continuing to monitor the protein levels in Manitoba soybeans and what that means for the marketplace.

I would like to thank the province of Manitoba for a great relationship with MPSG and its willingness to hear the concerns of our farmers. I look forward to working with the great people at the province.

Farm machines are big. Grain bins are tall. Please, I urge you, be safe out there. Just because it hasn't happened yet, doesn't mean it won't. Take the time to think things through and, please, make spending time with your loved ones a priority.

Have a great growing season!

— Calvin ■

Soybean Scout

Can you identify each beneficial insect species?

Answers can be found on page 50

Photo: Jon Gavloski, Manitoba Agriculture

A

Photo: Whitney Cranshaw, Colorado State University

B

Welcome our new staff.

Serena Klippenstein Production Specialist – West

"I have always enjoyed meeting and working with people involved in all aspects of the agricultural community," said Serena. "I'm looking forward to helping share the knowledge that MPSG and the Canadian pulse industry have to offer and getting to know the pulse growers and industry members in western Manitoba."

MPSG is pleased to welcome Serena Klippenstein as the new production specialist in the western region. She will be stationed out of Brandon, Manitoba for the 2019 growing season.

Serena grew up in Sanford, Manitoba, and has a lot of agricultural experience, which she accumulated through her education, her work on an apiary, in agricultural retail and her work in agricultural chemical sales in southern Manitoba.

In 2014, she completed her Bachelor of Science in Agriculture at the University of Manitoba with an agronomy major and a soil science minor. Following undergraduate studies, Serena worked as a full-time sales agronomist in the Portage la Prairie region before going back to university to work on a faba bean fertility project to pursue a master's degree in soil science at the University of Saskatchewan. She will receive her MSc in soil science in the fall of 2019.

When she's not at work, Serena enjoys travelling, hiking, camping (and "glamping") and playing recreational hockey, soccer and slow-pitch baseball.

Megan Bourns Agronomist – On-Farm Network

"The On-Farm Network presents a unique opportunity to positively impact agriculture, investigating novel products, practices and technologies that will expand production capacity, improve profitability and make strides toward sustainable farming systems," said Megan. "I look forward to working with our pulse and soybean growers!"

MPSG welcomes Megan Bourns who will be taking on the role of Agronomist – On-Farm Network.

Megan had exposure to agriculture from a young age, as both her parents' families have farms in southern Manitoba. Agriculture wasn't Megan's initial intended career path, though. She began her post-secondary in the pre-med program at McGill University.

Eventually, Megan came to realize that she wanted to pursue her interests in agriculture. So, she transferred to the University of Manitoba where she finished her undergraduate degree in the Faculty of Agriculture. Megan graduated in 2017 with a BSc (Ag), major in agronomy, and realizing her passion for research, began the MSc program in the Department of Soil Science.

During her master's studies, investigating potassium fertility and fertilizer response of soybeans, Megan had the opportunity to work with MPSG's On-Farm Network. This sparked her interest in on-farm research.

Megan is excited to apply her agronomic, research and communication skills in this role, facilitating meaningful and statistically valid research on farms, working directly with producers.

Introducing Julie and Pete, MPSG's 2019 summer students.

Julie Gullett

My name is Julie Gullett and I'm from Gilbert Plains, Manitoba, a small farming community in the Parkland region. I am currently going into my last semester of being an "aggie" at the University of Manitoba, majoring in agronomy. I'm looking forward to my time at MPSG and am excited to gain experience that I need for my future career as an agronomist. My goal for this growing season is to expand my knowledge on the production of lentils and legumes that are grown around Manitoba, as well as their major crop pests and continue to make good relationships around the province with different producers. I'm looking forward to getting out into the fields and enjoying the summer!

Pete Giesbrecht

Hi there. My name is Pete Giesbrecht and I'm an Ag Diploma student at the University of Manitoba. My wife and I live in Winkler and are anticipating the marriage of our oldest son in June, expanding our number of "children" to three married, plus one single. Returning to studies after a 20-plus-year absence has been a welcome challenge and opportunity. I anticipate using what I learn to further my goals of pursuing a career in international development in agriculture and expanding my hobby of field pea breeding. I am thankful for the opportunity to work at MPSG with the On-Farm Network, as research is one of my passions. I'm very much looking forward to the 2019 growing season!

Message from MPSG

Toban Dyck, Director of Communications

MANITOBA PULSE & SOYBEAN GROWERS has endured a few disruptions in 2019 and we'd like to think we're stronger for it. The markets, trade and a decrease in acres contributed to this, and I'll get to those factors a few inches down, but a major shake-up took place when Executive Director François Labelle was sent to hospital in life-threatening condition at the end of January.

STARS ambulance airlifted him to St. Boniface, where he underwent open-heart surgery. We're happy to report that the operation was a success and that by the time this magazine hits mailboxes, he'll be back at MPSG's helm.

While these disruptions could be seen as setbacks for the association, we're choosing to view them differently. We are treating them as learning opportunities. In François's absence, the value he brings to the organization, which was never in doubt, was re-affirmed.

And, as trade disruptions continue to ravage commodity prices, we're learning how to be even more prudent with your dollars without sacrificing the value we're delivering back to you and your operations. These are good lessons, and they're no doubt ones many individual farms are having to learn.

This year is also MPSG's 35th anniversary, an occasion we hope to celebrate with you all year.

MPSG's story begins in 1983 when a group of bean growers, along with John Rogalsky from Manitoba Agriculture, met to discuss strategy for accessing the Agricultural Stabilization Act support for Manitoba bean producers, which was at the time being paid to Ontario producers only. When producers contacted Ottawa, they were told that Ottawa would deal with an organized entity only, not with individuals. The organization was officially incorporated on March 13, 1984.

So, to usher in this year of celebration, we couldn't resist planning a party. We're hosting a golf tournament at Bridges Golf Course in Starbuck for our members — that's you! Don't miss your opportunity to attend and reminisce with past board members, current board members and other pulse and soybean farmers. Following nine holes of Texas scramble golf, there will be a banquet. All proceeds from the day's celebration as well as a donation from MPSG will go to STARS, who will have a presence at the event. Please see the event advertisement on page seven.

We continue to hope that markets will pick up for soybeans and that this year Manitoba farmers will get those needed late-season rains. Soy remains a very efficient source of protein and we're hopeful that the global demand for it will eventually outweigh the politics currently blocking its movement around the globe.

We continue to pay attention to the discussions surrounding Agriculture Canada's supercluster investment in proteins. Director of Research and Production Daryl Domitruk has been actively involved in advocating on behalf of Manitoba's pulse and soybean industry, fighting for a strong voice at the table.

The world is talking about protein and MPSG has spent time acquiring a piece of the action for Manitoba by ensuring government and industry recognize the unique attributes of Manitoba-grown pulses and soybeans.

MPSG has also received funding for many great research projects under the provincial Canadian Agricultural Partnership (CAP) funding model.

It was a busy winter featuring great extension events all over Manitoba. And now, Extension Coordinator Laura Schmidt is busy planning a full slate of summer programming ensuring we can pass the latest agronomic information directly to you, our farmers, while giving you the opportunity to engage face-to-face with us.

MPSG continues to expand its portfolio of production resources. A growth staging guide for faba beans is included in this issue of *Pulse Beat*, and a growth staging guide for field peas was published in the December issue. There is also reference to a fungicide checklist in Serena Klippenstein's *Pea Report* on page 26.

Also, don't forget to sign up to receive the *Bean Report*, which has become a signature publication and radio segment of its own. This timely and highly respected extension resource is brought to you through the hard work of many MPSG staff members, including agronomists, Cassandra Tkachuk, Serena Klippenstein and Laura Schmidt.

Our On-Farm Network continues to be a premiere research program for MPSG and its members. Through it,

continued on page 6

MPSG Increases its Commitment to Ag Extension Across Manitoba

This winter, Manitoba Pulse & Soybean Growers (MPSG) hosted its annual, farmer-exclusive, Getting it Right Crop Production Meeting in three areas across Manitoba. Ensuring MPSG's farmer-members have access to the most up-to-date research is a priority. Reaching three distinct regions in Manitoba helped achieve this.

Hosted in Stonewall, Winkler and Boissevain, Getting it Right was a series of half-day, farmer-focused events. These meetings equipped Manitoba's soybean and pulse farmers with the tools required to face production challenges and market access issues. This offered an opportunity for farmers to see where their MPSG research investments are going.

Moving to regional meetings allowed MPSG to address local issues and share research information pertinent to each specific region. Highlights included research results from MPSG's On-Farm Network and early-season pests of concern. Roquette shed some light on upcoming pea opportunities in Manitoba. In Stonewall, Kristen P. MacMillan discussed her latest research focusing on soybean seeding decisions. A new pest on the horizon, the soybean cyst nematode, was examined in Winkler by Dr. Mario Tenuta. Greg Endres shared NDSU's latest developments in dry bean research in Boissevain.

These presentations are available at *manitobapulse.ca/events/getting-it-right*.

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we're creating partnerships that have enabled us to assess more things in each trial, giving the grower a more complete picture of what's happening in his or her field in response to a particular input or management decision.

The world continues to talk about pesticide use and maximum residue limits (MRLs) in crops, a discussion that our partners Pulse Canada, Soy Canada and the provincial commodity groups have been actively engaged in. The collaborative campaign *Keeping it Clean!* and the advisory that comes from it aims to address the MRLs issue and is an excellent resource for farmers.

MPSG has lent its voice to discussions on pesticide use, urging regulators to recognize the important role crop protection products play in ensuring our crops and our ag sector remains profitable and competitive. We're also proposing ways in which the proper stewardship of these products can improve, to the benefit of our farmer members.

Dry beans saw an increase in acres this growing season, as markets for them have stayed strong. And, as Roquette continues to roll out programming and news of its operations, we hope to see an upward trajectory in pea acres, a crop many farmers have had great success growing.

Her name was briefly mentioned before, but we would like to officially welcome Serena Klippenstein, Production Specialist – West and Megan Bourns, Agronomist – On-Farm Network, to the MPSG team. We're honoured to have them and we believe they will both be assets to Manitoba's pulse and soybean industry. Please watch for them and be sure to say hello. We'd also like to welcome summer students Pete Giesbrecht and Julie Gullett.

We hope you have a great summer and an excellent, safe harvest. Drop us a line, if you have any questions or concerns. And, hopefully, we'll catch you in-person at an event, field tour or on the links at Bridges Golf Course.

— Toban ■

Notice to Members

In accordance with MPSG bylaws, any active member who wishes to bring forward a resolution to the annual general meeting (AGM) must provide notice to the board of directors by December 1 of the year prior to the AGM.

Resolutions to be presented at the February 12, 2020 AGM must be received by December 1, 2019.

Please forward to Sandy Robinson at **sandy@manitobapulse.ca** on or before that date.

MANITOBA Pulse Soybean GROWERS

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1:30 p.m. Registration

3:00 p.m. Shotgun Start | 9-Hole Texas Scramble

6:00 p.m. Dinner and Prizes

Register Online | manitobapulse.ca

REGISTRATION CLOSES JUNE 28

For more information contact

Melissa Denys-Roulette | 204.745.6488 ext 104
melissa@manitobapulse.ca

Toban Dyck | 204.745.6488 ext 109
toban@manitobapulse.ca

Industry Partners interested in sponsoring or donating prizes, please contact Melissa or Toban.

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Advocating for Effective Business Risk Management Programming

Erin Gowriluk, Executive Director, Grain Growers of Canada

Grain Growers of Canada / Les Producteurs de grains du Canada

GROWERS DEAL WITH risks all year long, but managing those risks can be top of mind during planting. With all that money and energy that they are investing, growers want to know that they will be able to manage the risk of weather, markets and everything else that can impact your bottom line between the time that crop goes in the ground and when it leaves the farm.

We know that government programs used to be an essential part of the grower's toolbox in managing that risk. But over the years it seems like those tools have been getting smaller and cheaper, which has left growers with big gaps in their risk management toolbox.

We have long argued for changes that will make programs more simple, predictable and bankable, but it seems like governments have often turned a deaf ear to our concerns. That changed in July 2017 when agriculture ministers launched a new policy framework. While the framework only included minor tweaks to business risk management (BRM) programs, ministers finally launched a comprehensive review of BRM programs.

After receiving the recommendations of an expert advisory panel in July 2018, ministers directed officials to work on the recommendations and report back in July 2019. The recommendations included looking at top-up programs to fill the gaps in the existing suite, finding ways to improve AgriStability and to improve education and awareness about the BRM suite.

The July 2019 meeting is now fast approaching and Grain Grower of Canada (GGC) is ramping up its efforts to make sure ministers continue the work of making meaningful changes to the BRM suite. As part of our work we recently surveyed our members to get their perspectives on what needs to change. There are different perspectives on how to fix programs, but there were some key themes that came out of the survey.

First, farmers are looking for programs that are simpler to understand and easier to work with. That is one of the main reasons there is so much support for the AgriInvest program and so much opposition to AgriStability.

Second, farmers want programs that are effective at managing risk. For the most part, growers feel crop insurance is an effective tool because it directly responds when their production declines below the insured threshold. They do not see the other programs responding in the same way.

Third, the cost should be second. No GGC member is calling for significant new dollars to be invested in risk management, but all agree that cost should not limit effective programming. The priority should be designing effective demand-driven programs; cost should be second.

Finally, growers have lost confidence in AgriStability. We heard that growers want margin protection, but they have no confidence in AgriStability to provide that protection. There was a long list of recommendations about how to fix AgriStability, and securing those changes be a priority for GGC going forward.

GGC is drilling deeper on a couple of critical questions and will continue to work closely with our members to make sure we are advocating for changes that will deliver the effective risk management programs that farmers are looking for.

This summer's Agriculture Ministers' meeting will be a significant milestone on the long road to BRM reform, but the road won't end there. It's important that federal and provincial ministers, MPs and MLAs hear about the need to fix BRM programs before the meetings this summer. GGC is available to help make sure you are getting the right messages to the right people on this key issue.

We all hope that weather, markets and everything else will cooperate and that you will not have to worry about risk management, but we know it rarely works that way. That is why we will keep advocating for more effective risk management programs and why we are committed to working on your behalf on this and other issues impacting the competitiveness and profitability of grain growers across Canada. ■

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Ron Davidson, Executive Director, Soy Canada

ALTHOUGH TELEPHONE AND e-mail technologies are indispensable for communications, they do not equal the value that can be gained from interpersonal contact. In April, I was afforded to meet with the board of directors and staff of Manitoba Pulse & Soybean Growers as well as with processor and exporter representatives. The two days of discussions not only contributed significantly to both ensuring the Manitoba perspective is taken into account when liaising with the numerous officials at the national level whose perceptions and decisions impact every component of the soybean sector, but also in the future planning and delivery of Soy Canada activities.

MANITOBA A PILLAR OF CANADIAN SOYBEAN PRODUCTION

Since 2013, Manitoba has consistently ranked as Canada's second most significant soybean-producing province — and soybeans are solidly entrenched as the third most valuable field crop. Although 2019 will record a second contraction from the peak reached in 2017, Statistics Canada projects that seeded area in the province (1,571,100 acres) will still exceed that of 2015. Even at this level, acreage in Manitoba will surpass that in Quebec, Canada's third largest soybean producing province, by a substantial 86% or 725,400 acres.

Beyond 2019, Soy Canada anticipates that the east–west ratio of soybean production will resume its westward progression. Eastern Canada will remain constrained by both few opportunities for expansion into new production regions and the widespread current inclusion of soybeans in crop rotations.

Conversely, intensified public and private sector research and regionally-focused varietal development in western Canada will support further expansion into new geographic regions, particularly those that are characterized presently by rotations limited to only two crops.

NON-MARKET FORCES EXERT PROFOUND IMPACT ON EXPORTS

Since early 2018, the threat, and then the reality, of U.S. import tariffs — followed subsequently by Chinese retaliation — have exerted a dramatic impact on global soybean trade.

Canada recorded unprecedented volumes of soybean exports to China in June, July, September, October, November and December. By the end of the year, Canadian exports to China had soared to an unprecedented 3.6 million metric tonnes — compared to 1.8 million in 2016 and 2.0 million in 2017.

Prior to 2018, China had never exceeded 40% of Canadian exports. Last year, China's share exceeded 59%. Excessive dependence on a single market increases risk and undermines the durability of long-term relationships and diversification initiatives elsewhere.

While the extraordinary demand from China in 2018 was certainly appreciated, other implications of the U.S.-China dispute are less sanguine:

- China increased incentives to entice greater domestic production and reduced, perhaps permanently, the amount of soy protein included in livestock rations;
- the U.S. government allocated a subsidy of U.S. $1.65 per bushel to American producers and millions of additional dollars for export market development
- actions that were not matched by the Canadian government;
- soybean exports to Canada's non-China markets encountered intense competition from the U.S. As an example, during the four years between 2014 and 2017, the European Union (EU) accounted for an average of 1,194,671 tonnes, or 26.9%, of Canadian exports. In 2018, the EU share tumbled to only 697,048 tonnes or 11.5% of Canadian exports. As the EU is, by far, the second largest global importer of soybeans, it is critical that Canada retain and strengthen trade relationships with EU member countries and importers; and
- there continue to be signals that an eventual (albeit prospective at of writing) China-U.S. free trade agreement will include a commitment by China to manage future agriculture and agri-food imports to the benefit of American producers, processors and exporters.

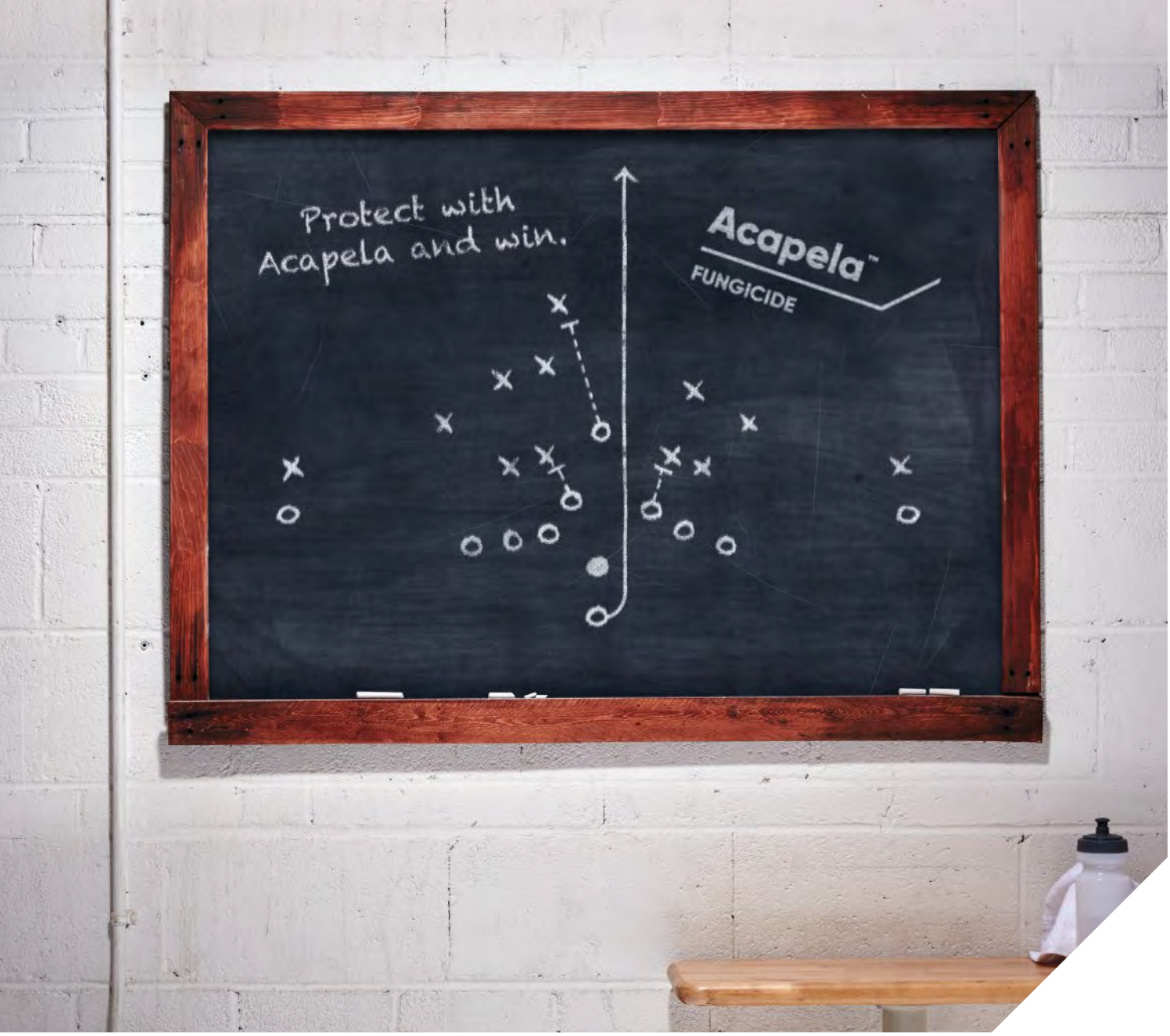
MARKET DEVELOPMENT MISSION TO JAPAN AND VIETNAM

Japan is consistently one of Canada's top three export destinations, importing in excess of 350,000 tonnes of soybeans valued between $250 and $300 million annually. The Japanese expect regular engagement and consultation. Vietnam was Canada's sixth largest foreign market in 2018, importing 120,088 metric tonnes valued at over $68 million.

Undertaken from February 22 — March 1, 2019, a Soy Canada trade mission to Japan and Vietnam included: two representatives of provincial producer organizations; 14 representatives from exporter members, and an internationally recognized soybean genetics and variety development researcher.

Mission members met with industry organizations as well as individual importers and processors and presented well-attended seminars. Formal presentations included: Overview of the Canadian Soybean Industry; Soybean Research and Variety Development; Innovation and Sustainability from a Producer Perspective; and, Canadian Soybean Production and Market Outlook. Seminars were followed by open question and answer sessions and individual exporter–importer meetings.

After addressing both known and new issues of concern to each country, the overarching message received by mission participants was that Canada should be present and engage more frequently with client countries and companies. ■



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Pulse Canada

Protect Your Investment by Keeping it Clean This Growing Season

WITH OVER 85% of Canada's pulses going to export markets, Canadian pulse producers know that maintaining market access is critical to protecting their investments and growing our industry. Growers have a key role to play in keeping the doors to pulse export markets open.

WHY KEEP IT CLEAN?

Growers work hard to maintain Canada's reputation as a global supplier of safe, high-quality crops. The pulses grown in Canada must meet the quality expectations of our end customers, as well as the regulatory standards of importing countries — including their tolerances for crop protection product residues. Both growers and members of the trade must pay close attention to the Maximum Residue Limits (MRLs) in place in our export markets. With heightened public sensitivity surrounding pesticide residues and enhanced residue testing in many of our industry's major markets, it is paramount that all members of the pulse value chain work together to ensure the pulses grown in Canada do not exceed international MRLs.

For this reason, the Canadian pulse industry has enhanced its support for the *Keep it Clean!* initiative. *Keep it Clean!* is a joint effort between Pulse Canada, Cereals Canada and the Canola Council of Canada that provides growers with the information they need to ensure their crops are market-ready. The objective of *Keep it Clean!* is to provide accurate, relevant and timely information to Canadian growers that will help them make informed crop protection product choices.

2019 PULSE GROWER ADVISORY

As part of *Keep it Clean!*, the Canadian pulse industry also produces an annual advisory that informs growers of current market considerations associated with various pulse crop protection products. The advisory is produced by Pulse Canada with input from a range of experts including members of the provincial pulse associations, pulse agronomists and members of the pulse trade.

Pulse Canada encourages all growers to read the advisory carefully prior to making their crop protection plan for the 2019 growing season. The 2019 Pulse Grower Advisory can be found on pages 43 and 44 of this magazine, and is also available for download on keepingitclean.ca.

FOLLOW THE LABEL TO KEEP MARKETS OPEN

Maintaining market access starts at the farm level. In addition to consulting the 2019 Pulse Grower Advisory, growers can protect their own investments and do their part to keep markets open for all by always reading and following crop protection product labels. The label outlines how a product can legally be used — including proper rate, timing and registered crops. Improper or off-label use of crop protection products may result in unacceptable residue levels that can jeopardize a producer's marketing options, as well as market access for all Canadian crops.

Growers should also remember that glyphosate can only be applied to pulse crops when seed moisture content is below 30% in the least mature part of the field. Applying glyphosate too early or too late could have serious negative implications on product residue levels. Glyphosate is registered for pre-harvest weed control, and should not be used as a desiccant.

Prior to using any crop protection products, growers should also consult with their exporter or processor about which products are acceptable in international markets. Exporters typically have a good sense of which markets may be sensitive to specific products.

MORE INFORMATION AT KEEPINGITCLEAN.CA

For more information about how to ensure crops are ready for market, visit keepingitclean.ca. Growers can also get the latest *Keep it Clean!* updates by following @KICCanada on Twitter, or stopping by the *Keep it Clean!* booth at agricultural events such as Crops-a-Palooza, Ag in Motion and the Crop Production Show. ■

DATES TO REMEMBER

- **MPSG 35th Anniversary Golf Tournament**
  Thursday | July 4
  Bridges Golf Course, Starbuck, MB
- **Crop Diagnostic School**
  July 9–12 | July 16–18
  Carman, MB
- **SMART Day**
  Tuesday | July 23
  Carman, MB
- **Crops-a-Palooza**
  Wednesday | July 24
  Carberry, MB

Clancey's Stats

Pulse market analysis

Brian Clancey, Senior Market Analyst and Publisher, STAT Communication

LAND IN PULSES and specialty crops will decline this year if farmers stick with their seeding intentions.

Statistics Canada found farmers intend to plant 8.82 million acres of pulses and special crops, down from 8.98 million last year and below the recent five-year average of 9.52 million acres.

The only crops showing an increase over last year are peas, which could climb from 3.615 to 4.035 million acres and canaryseed, with farmers saying they will increase area from last year's official 212,100 acres to 228,600.

Lentil area could drop from 3.768 to 3.404 million acres, while dry edible beans fall from 367,500 to 324,700 acres; chickpeas from 442,900 to 334,300; and mustard from 503,800 to 416,300 acres. Sunflower was basically unchanged at an intended 70,600 acres.

The most controversial number remains canaryseed, with processors believing both last year's seeded area and this year's intentions are higher than the official estimates.

Statistics Canada does not break down seeded area by class. Its first estimate of the seeded area by class will be released later in the year.

There can be significant differences between seeding intentions and actual planted area. How markets react to the numbers is a factor for some growers, while spring seeding conditions can force changes in crop choices, and unexpected outside market factors can cause major shifts between what is actually planted and the intentions.

During the previous five years, land in lentils averaged 6% higher than the intentions, while peas was 1% lower, dry edible beans 25% higher, chickpeas 34% higher, canaryseed 13% higher and mustard 9%.

There can be significant drops between what was intended and what was finally sown. Last year's trade issues with India resulted in a 7% reduction in pea and lentil plantings, while in 2015 the final chickpea area was 15% lower.

This year, China has become a negative factor in markets because of its effective bank on canola imports, massive declines in the size of its hog herd, and speculation by some market participants that China will extend its import ban to peas. Whether India becomes a positive demand factor depends on the progress of monsoon and possibly the results of its national election. There is modest hope that if a new government is elected, some trade policies could be reversed.

Interestingly, the increase in field pea area mirrored the experience in the United States (U.S.), where farmers intend to boost field pea area from 856,000 to 881,000 acres. Growers in both countries are seeing solid increases in overall demand, though processors in the U.S. are more focused on domestic than export movement. With the exception of split peas, exports of U.S. peas were down between September and February and Canadian exports were up.

The expansion of the pulse fractionation industry along with increased in using pulses in pet foods has fundamentally changed domestic demand. While Canadian peas have been strongly competitive in export markets, government buying plus expanded domestic markets and the trade war between China and the U.S. have limited the capacity of U.S. exporters to expand sales.

If Canadian growers stick with their intention to boost area from 3.615 to over 4.0 million acres, average yields would see production advance from 3.58 to 3.97 million metric tonnes (MT). Even so, markets are expected to absorb more

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than what might be grown with the result residual supplies of peas could drop from 207,000 to 200,000 MT by the end of the 2019–20 marketing campaign.

Media reports suggest the potential for problems with China, but none have been confirmed. The bigger issue in China is the contraction of the hog herd because of China's hog herd because of African swine fever. By March, the national herd was down 19% and the number of female hogs was down 21%, suggesting the number of hogs will continue to drop. On the other hand, China's hog industry has been rationalizing in favour of larger facilities. Some observers think this will not result in as a big change in demand for commercial feed than might otherwise be the case. This suggests Canada will continue to see solid demand for peas as long as prices are competitive with other ingredients.

It does not mean prices will be higher on average during the first three to six months of the coming marketing year. Grower selling and the need to be price competitive with other feed ingredients will be key drivers in terms of price. The bigger problem is that to the extent farmers think they will get better returns by holding, stocks may not decline fast enough relative to prospective demand to move enough of the crop to allow price recovery during the last half of the marketing year.

Markets continue to look at conditions in India, hoping predictions of a slightly below normal monsoon are realized. This tends to reduce the amount of land in pulses, which could see demand from the Indian subcontinent improve as the marketing season advances. However, supply fundamentals in India are not negative and without a dramatic change in seeded area in the coming kharif and rabi growing seasons, government policies towards imports may not change.

Heading into the seeding intentions report there were conflicting views about the direction lentil seedings would take. Some felt strong movement and what appeared to be historically good prices would result in an increase.

While movement of red lentils has been good and prices trending upward, prospective gross returns per acre are below last year and their recent three averages. More often than not, this can result in a decline in total area. This appears to be what growers were thinking, with the result land in lentils in Canada could drop from 3.77 to 3.41 million acres.

Area was not broken down by class, but it is likely red lentil area increased at the expense of green. Green lentil fundamentals are not looking negative, but the ease of movement of red lentils combined with relatively good returns likely drove grower interest in the crop. In simple terms, last year's pessimism has been replaced by cautious optimism.

A return to average yields would see production of all classes of lentils slip from 2.092 to 2.047 million MT. The red lentil share of production is expected to jump from 56% to 65%, while the large green share drops from 28% to 23% and small green from 12% to 9%.

Total exports may be similar to this season, slipped from almost 1.96 to just under 1.91 million MT. This could see residual supplies of all classes of lentils drop from 557,000 to 260,000 MT by the end of the coming marketing campaign.

Prices for red lentils should be strongly influenced by the pace of bulk export demand, while greens may face increased competition from exporters in the U.S.

Most of the U.S. crop is green lentils. there is a chance available supplies of green lentils in the U.S. will increase from around 522,000 MT this season to 543,000 in the coming marketing year.

Unless disappearance increases, residual stocks of lentils in the U.S. will remain relatively high, perhaps approaching a 40% stocks to use ratio. While an improvement over this season, green lentil markets are not as large as red, with the result competition for available demand could be intense. ■

NORTH AMERICAN PULSE PRODUCTION SUMMARY

	2015	2016	2017	2018	2019
Area (acres)					
Lentils	4,036,200	5,569,000	4,406,000	3,768,100	3,404,800
Dry Peas	3,750,000	4,281,700	4,093,000	3,615,300	4,035,900
White Beans	87,000	83,400	103,000	93,300	73,900
Coloured Beans	175,000	227,700	260,100	274,200	250,800
Chickpeas	123,000	156,000	209,000	442,900	334,300
Soybeans	5,532,000	5,607,397	7,282,000	6,320,100	5,646,200
Total	13,703,200	15,925,197	16,353,100	14,513,900	13,745,900
Production (metric tonnes)					
Lentils	2,541,500	3,193,800	2,559,500	2,092,200	2,046,800
Dry Peas	3,200,700	4,835,900	4,112,200	3,580,900	3,968,000
White Beans	76,700	71,600	94,700	93,600	64,000
Coloured Beans	168,500	193,100	259,700	273,400	199,000
Chickpeas	89,900	91,200	118,600	311,300	209,000
Soybeans	6,456,300	6,596,500	7,716,600	7,515,000	6,386,000
Total	12,533,600	14,982,100	14,861,300	13,866,400	12,872,800
Yields (lbs)					
Lentils	1,388	1,264	1,281	1,224	1,325
Dry Peas	1,882	2,490	2,215	2,184	2,168
White Beans	1,944	1,893	2,027	2,212	1,909
Coloured Beans	2,123	1,870	2,201	2,198	1,749
Chickpeas	1,611	1,289	1,251	1,550	1,378
Soybeans	2,573	2,593	2,336	2,621	2,493
Total	11,520	11,399	11,311	11,989	11,023

ROQUETTE
Offering the best of nature™

Roquette Canada Ltd.

The Yellow Pea Era Begins in Manitoba

Bruce Brolley, Senior Agronomist, Roquette Canada

ROQUETTE IS A global leader in plant-based ingredients and is a pioneer of new vegetal proteins, using potatoes, corn, wheat and peas as raw materials. Roquette is a family-owned business that was founded by two brothers in France in 1933 as a potato starch processor. Today, the company is owned by more than 250 family shareholders (the fifth generation) and has 20 processing plants around the world selling plant-based ingredients to over 500 customers in more than 100 countries. Roquette works in a wide range of markets including pharmaceutical, cosmetic, human food and nutrition, pet food and industry.

In 2005, Roquette started processing peas in France. The demand for our high-quality pea protein, fibre and starch led to our investment in Canada and the building of the new pea processing plant in Portage la Prairie, Manitoba. With the processing facility currently being built, Roquette will begin contracting yellow peas directly from farmers for the 2020 growing season. The Portage pea plant will produce Roquette's highly successful Nutralys protein products, which can be used as a soluble protein for the special diet market segment and as a texturized pea protein for the meat analog industry. The plant will also produce pea starch and pea fibre along with a livestock feed.

As a company, Roquette is committed to sustainability. We are committed to increasing the percentage of raw materials used in our plants around the world that are certified or rated as "sustainable and responsible." To achieve this goal, Roquette is focused on three sourcing principles.

1. SOURCING SUSTAINABLY

The Portage pea facility will play a part in achieving this goal. Firstly, peas are a legume crop and fix the majority of their own nitrogen, greatly reducing the need for commercial nitrogen fertilizer. Secondly, the plant will run using sustainable hydroelectric power and it is close to our key North American markets, which allows for efficient distribution of finished products.

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2. CONTINUOUSLY IMPROVING OUR RAW MATERIAL QUALITY

As a new processor to Canada, Roquette is evaluating the processing quality of yellow pea varieties currently available in the marketplace as well as new varieties being commercialized. In time, Roquette will have a list of preferred varieties. At this time, however, we will work with any commercial yellow pea variety as we continue to build our pea quality database to better understand the effect of genetics on the environment in which the peas were grown.

3. STRENGTHENING OUR RELATIONSHIP WITH OUR RAW MATERIALS SUPPLIERS

Roquette values long-term relationships with producers who supply raw materials to our processing plants. At many of Roquette's processing facilities, such as the pea processing facility in France, we have built long-term relationships with growers and have worked with many of the same growers consistently year after year. At the Portage pea plant we have the same goal of developing strong partnerships with farmers and having them grow peas for the plant each year. Over time, our goal is to work with local farmers to increase pea acres in Manitoba to be able to source more of our pea requirements closer to the plant.

CONTRACTING YELLOW PEAS FOR 2020 – CONTRACT REQUIREMENTS

Roquette will start contracting Canada #2 yellow peas in the 2020 crop year. We will have full production contracts for the total volume of peas grown on the contracted acres. In order to ensure a consistent supply of peas to the plant, we will source peas from Manitoba and southeastern Saskatchewan to cover a range of growing regions.

As a processor, Roquette is concerned with gluten and soybean allergens in our end products. Our biggest allergen concern is soybeans: Their similar shape, colour and size to peas makes them extremely difficult to clean out of peas, even with advanced cleaning equipment. Our strategy to manage soybean contamination will focus on prevention. Prevention will start with the use of certified pea seed and then field selection. We will ask producers as a part of their field selection process to consider their rotation and choose fields that have not grown soybeans on them for the previous two years. This is our only rotational restriction.

Producers growing both peas and soybeans on their farm will have to take extra care to reduce the risk of contamination on farm. Contamination can occur in equipment that was last used for soybeans (combine, augers, bins, trucks, etc.). Farmers will need to pay careful attention to reduce contamination of soybeans with peas. Farmers will have to ensure that equipment last used for soybeans has been cleaned before using the same equipment for peas.

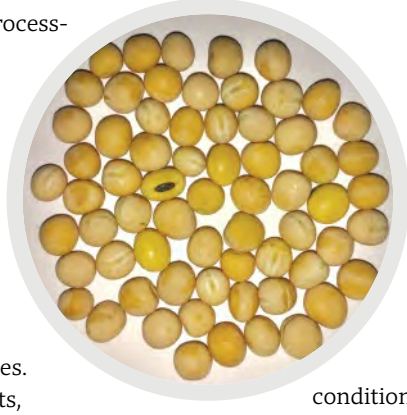
Roquette will be purchasing a #2 yellow pea but due to the challenges of cleaning soybeans out of peas, our contracts will have a very low tolerance of soybeans. Careful management will be required to ensure that the low tolerance is not exceeded.

The Roquette pea processing plant will provide farmers a stable, domestic marketing option for peas. As an exporter, Roquette is required to observe maximum residue limits (MRLs) for the pea products entering our target markets, such as the United States. To maintain our markets, we need to ensure that farmers supplying peas to the plant are applying crop protection products according to the label, at the right time and at the right rate. Reglone (diquat) is the only exception. While Reglone is registered for use in Canada as a desiccant, Roquette's pea contracts will not allow its use due to MRL restrictions with the United States.

Today's manufacturers and consumers are demanding more information on how their food is produced and its sustainability footprint. After careful evaluation, Roquette identified the Environmental Farm Plan (EFP) as the best approach to demonstrate that our supply chain is being produced in a sustainable manner without being too invasive to the growers we work with. An EFP guides producers on conducting a confidential self-assessment of their own farm, identifying their own risks and developing their own action plan. Roquette will only require the certificate and will not have access to the details of farmers' EFP, their self-assessment or action plan. Farmers under contract will be required to complete an Environmental Farm Plan including the Yellow Pea Chapter.

2019 TRACEABILITY AND SAMPLE COLLECTION PROGRAM

Traceability is a critical component of Roquette's sourcing philosophy. Roquette must be able to trace each lot of peas back to the farm, the field they were grown in, how those peas were managed, which bin(s) they were stored in and the trucks in which they were transported. To collect this information, Roquette is planning to use electronic data collection systems that producers are already using or a spreadsheet to provide current crop conditions on their contracted pea acres and the traceability information that is required.



Soybean contamination in yellow peas is difficult to see and even more difficult to separate from peas. There are four soybeans in the pea sample.

In preparation for contracting for the 2020 growing season, we have launched a **2019 Traceability Program**. Roquette is looking to partner with current pea growers to record their pea management practices, submit the information on a timely basis to meet certain timelines and provide Roquette with a pea sample. The Traceability Program is a test run to validate and fine-tune our traceability platform that will be in place with our 2020 contracts, to make the traceability requirements as user friendly as possible and to continue to build our pea quality database.

Producers who choose to participate in our 2019 Traceability Program will receive $150 directly from Roquette, will

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The Challenge and Promise of Soybeans in Canada – A Definitive Guide

Toban Dyck, Director of Communications, MPSG

There's uncertainty in the marketplace. The commodities market seems feral, wild, unpredictable. China has completely stopped importing Canadian canola and has virtually done the same with our soybeans. The Canadian farmer was once the casualty of a U.S.-China trade war, but that has changed. We're involved in our own battles now.

I sat down with Soy Canada's Executive Director, Ron Davidson for insight into our soybean industry, its markets and its future. Davidson's responses are packed with incredible and new information that shows the longevity of the legume as an unparalleled source of protein, as well as source of pride for Canadian farmers.

The following also underpins the importance of groups such as Soy Canada in ensuring our farmers are intelligently positioned in the global marketplace. Enjoy!

Q – *There's uncertainty in the global marketplace. Where do you see this heading and how long until it settles?*

A – Canada is at present in a particularly challenging time as the United States-China trade dispute severely disrupted normal trade patterns in 2018. In the Spring of 2018 when China implemented a 25 percent retaliatory tariff on U.S. soybeans, Canadian prices, which are based off future prices on the Chicago Board of Trade, fell significantly. As the summer rolled out, U.S. exports to China virtually ceased, opening up greater Canadian export potential to that country.

Canadian exporters experienced strong demand in China, but at the same time the United States aggressively competed with low prices for market share in Canada and the 70 other export destinations. Hence, while Canada's soybean exports to China increased by 82% in 2018 to 3.6 million metric tonnes, exports to the European Union fell by 45% or 575,553 tonnes. Canada's increased dependence on exports to China created a vulnerability that became tangible at the beginning of March when China suspended the canola licenses of two Canadian companies.

Exports of Canadian soybeans to China slowed dramatically to a trickle since the beginning of 2019. It would appear that three factors have contributed to the change: first, unprecedented Canadian exports to China during the September to December, 2018 period (3.2 million tonnes in 2018, compared to 1.4 million tonnes in 2017, and 1.3 million tonnes in 2016); second, availability of a large 2019 soybean harvest in South America; and, third, uncertainty by Chinese importers pertaining to future market access conditions in China.

The positive aspect of the current situation is that China had imported 44% of Canada's entire 2018 harvest by the end of 2018. Neither Soy Canada nor the Canadian government is aware of a formal decision by China to impede or prevent the importation of Canadian soybeans or soy products. Conversely, it will be necessary for Canadian exporters to reclaim some of the market share elsewhere that was ceded to American soybeans in 2018.

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have the opportunity to provide input into the traceability requirements that will be in place with our contracts, and will have the first chance at contracts for the 2020 growing season. Growing peas? We are accepting producers into our 2019 Traceability Program until June 30 – please get in touch to find out more.

With the investment of a new processing plant in Portage la Prairie, Roquette will be a part of the Manitoba Agri-Processing Industry for a long time to come. Roquette's goal is to build long-term relationships with producers, and to help them grow peas sustainably and profitably so producers consistently put peas in their crop rotation and supply peas to our plant every year.

Details of our full production contracts, including the premium for implementing our traceability and management requirements, will be released this fall when we start contracting for the 2020 growing season. ■

Interested in working with us on our 2019 Traceability Program?
Want more information on our contracts for 2020?

Please get in touch with our team and we will follow up with our contract information in the fall and let you know about the details of our summer tours and contract launch meetings.

- **Bruce Brolley**, Senior Agronomist, Roquette Canada
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Q – *How much does Canada's soybean market depend on China—how much do we export to them—what kinds of soybeans do they want?*

A – China was the single largest export market for Canadian soybeans in each of calendar years 2015 (1.2 million tonnes, $589 million), 2016 (1.8 million tonnes, $948 million), 2017 (2.0 million tonnes, $998 million) and 2018 (3.6 million tonnes, $1.7 billion).

By value, China accounted for 36% of Canadian exports in 2017 and 54% of Canadian exports in 2018. By volume, China accounted for 39% of Canadian exports in 2017 and 59% of Canadian exports in 2018.

On average, in 2017 and 2018, 80% of exports to China were identified as soybeans for crushing (i.e., into soy oil and soy meal) and 20% were identified as being for other purposes (e.g., soy milk, tofu, tempeh, miso and edamame-type products).

Canadian export statistics do not differentiate between GM and non-GM soybeans. However, it is believed that the GM to non-GM ratio is approximately the same as the ratio of soybeans for crushing (80%) to soybeans for other uses (20%).

Q – *How are new markets for soybeans created? And what new markets could be available?*

A – The world is already very familiar with soybeans as a source of high-quality protein and vegetable oil for both human and livestock consumption. Although Canada currently exports soybeans and soy products to some 70 countries around the globe, more than 80% is shipped to only four destinations: China, European Union, United States and Japan.

Increasing soybean production in Canada during the coming years will require an equivalent expansion in export volumes. Canada cannot match the intensity of technical and trade development missions undertaken by certain competitor countries. Nevertheless, foreign importers are requesting that this country be present more frequently in their countries than has been the case in the past. Although successive Canadian market development and liaison missions over many years have developed and supported a strong reputation for this country's identity-preserved/non-GM soybeans, there remains a need for enhanced development and promotion of the Canadian perspective with respect to the availability and quality of Canadian crushing/GM soybeans.

Soybean meal has long been used in livestock rations, particularly in the pork and poultry sectors. A more recent occurrence has been the expanding promotion and use of soy as a food source in the aquaculture sector. Aquaculture will become an increasingly substantial market for soybeans as the sector continues its expansion and increases its familiarity with the use of soy as a high-quality fish food.

Although not yet produced commercially in Canada, the production of high-oleic soybeans is expanding in the U.S. High-oleic varieties have been grown successfully in Ontario, but commercially viable production has been impaired to date by the absence of both a local crushing facility and assured food sector demand. Should food sector demand for high-oleic soybean oil extend into Canada, the initiative to secure processing in Canada would be renewed.

Sustained consumer demand for more environmentally-friendly products is acting as a catalyst for the use of vegetable oils to replace petroleum in motor oils and lubricants. As these products become better known, commercial and consumer demand for "green" products could drive growth in the use of soy oil.

Vegetable oils are already being used in the production of Canadian biofuels. Oilseed demand could increase significantly should the current campaign to increase the percentage of fuel that is produced from renewable sources be successful.

Soy is unique among major field crops in that, similar to meat, soybeans offer all of the essential amino acids required by humans. Taking into account the protein content and quality of soybeans, Health Canada, the Canadian Paediatric Society, Dietitians of Canada, and the Breastfeeding Committee for Canada have jointly stated: "For the older infant and young child who is no longer breastfed and is not being introduced to cow milk, soy-based commercial infant formula is recommended until two years of age" and "Other plant-based beverages, such as almond, rice, and coconut 'milks', are not nutritionally comparable to homogenized (3.25% M.F.) cow milk. They have a very different macronutrient composition, and are not suitable milk alternatives."

"Given available land area and crop rotation constraints in eastern Canada, Soy Canada believes the opportunity to substantially increase soybean production in this country rests almost exclusively in western Canada."

Nearly two-thirds of the soybeans grown in Canada are destined for export markets, either as raw soybeans or processed for end use. Soy Canada works diligently on behalf of the entire soy value chain to maintain and enhance existing markets and develop and expand into new markets throughout the world. Soy Canada participates in Government of Canada trade missions as well as leading market development missions that include producers, exporters and subject specialists.

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Q – *How important are relationships in the global marketplace? Are face-to-face meetings valuable? What do they accomplish?*

A – It is important that exporters create and maintain relationships with foreign buyers. Although cultural expectations do vary by country, enduring business transactions are built upon personal relationships.

At the highest level, the federal government works to establish a positive trading environment via free-trade agreements with key trading partners and to promote Canadian exports through dedicated staff at Embassies and Consulates worldwide.

Soy Canada participates in multi-commodity ministerial trade missions and organizes sectoral market development missions consisting of: seminars and presentations to importers and end-use stakeholders; business-to-business meetings; industry association meetings; and, networking receptions. Through these activities, Soy Canada showcases the quality of Canada soybeans and soy products and facilitates business relationships between Canadian exporters and foreign buyers and end users.

Q – *What is Soy Canada's view on the market for non-GM soybeans? Explain.*

A – Soy Canada supports the production, processing and export of GM, non-GM/identity-preserved and organic soybeans and soy products. The GM/non-GM ratio of the Canadian soybean crop fluctuates according to the amount of the premium that is offered to producers for non-GM soybeans.

Soy Canada meet with customers in Japan.

The production of non-GM soybeans continues to be strong in eastern Canada and is in the early phase of introduction into western Canada. As the seeded area of GM soybeans has been expanding more quickly than that of non-GM, the percentage of the Canadian crop that is non-GM has been decreasing. It is estimated that about 25% of Canadian production is non-GM.

Canada is a global leader in producing non-GM soybeans for world markets. Most of these soybeans are grown in Ontario and Quebec between the Great Lakes and in the St. Lawrence River basin. Canadian non-GM soybeans have an excellent reputation and performance throughout the world, especially in Asian markets where the characteristics of Canadian soybeans are greatly appreciated for the production of edamame, tofu, soy sauce, soy milk and miso. Canadian exporters continue to serve traditionally strong markets such as Japan while growing exports to destinations like Vietnam and Thailand that show great potential for growth.

Q – *How do soybeans move along the value chain—from when the farmer delivers to the elevator to final destination?*

A – As Canada's third most valuable field crop, the impact of the Canadian soybean sector extends throughout the Canadian economy. Through Soy Canada, all industry partners work together to maximize the progress and value of the industry.

The full value chain of the Canadian soybean industry extends from public sector research scientists and private sector seed developers to pedigreed seed growers, seed distributors, producers, inland elevators, railways, terminal elevators and ships.

On-farm knowledge ensures the production of high-quality soybeans that meet customer specifications, using techniques that respect Canada's productive and pristine environment and natural resources. After harvest, soybeans are transferred from farms to grain elevators and then through the cleaning, sorting and grading processes.

Most Canadian soybeans (a record 6 million tonnes in 2018) are delivered to one of Canada's large coastal shipping ports for export to offshore markets. The remaining soybeans (approximately 2 million tonnes) are transported to Canadian processing plants for transformation into soybean meal and oil, and then end-use products for livestock producers, consumers and industrial markets.

Safety and quality regulation are essential to the industry. Organizations such as the Canadian Grain Commission

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and the Canadian Food Inspection Agency conduct or oversee monitoring, testing and certification to ensure high standards are met for all customers.

Q – *Please list the ways the western Canadian soybean industry could better position itself in the global marketplace and why.*

A – Given available land area and crop rotation constraints in eastern Canada, Soy Canada believes the opportunity to substantially increase soybean production in this country rests almost exclusively in western Canada. Pursuit of the following objectives would strengthen the western Canadian soybean industry:

- Strengthen research that is undertaken by public institutions. Public institutions are well-equipped to investigate factors such as biotic and abiotic stressors and genomic characteristics that impact soybean yield and quality;
- Seed developers create varieties that respond explicitly to the growing conditions of western Canada. There is a demand for locally-adapted varieties that increase predictable yield and drought resistance in current production regions and extend production into new frontiers, particularly those in which a third option is required for current two-crop (canola-cereals) rotations;
- Increase predictable protein content. Soybeans are primarily a source of high-quality protein and western Canadian soybeans incur a protein discount compared to soybeans produced in eastern Canada;
- Expand soybean crushing capacity. There are no large-scale soybean crushing facilities in western Canada and local crushing would support higher producer returns and expanded pork production and exports;
- Ensure reliable rail transportation and port capacity. Foreign buyers wish to receive their supplies on schedule;
- Create a local storyline and pamphlet for western Canadian soybeans. The western Canadian soybean sector should strengthen its reputation for quality and reliability by developing and telling its own story rather than permitting others to create the image.

"Unless the foreign voices are countered, it is inevitable that their assertions will eventually become implanted in the minds of foreign buyers and result in scepticism about the quality and relative value of Canadian/western Canadian soybeans."

Q – *When you spoke with our board, you mentioned the need for western Canada to make its own mark in the global soybean marketplace—tell its own story. Please explain this.*

A – The global marketplace for Canadian soybeans is characterized by intense competition from large and well-financed counterpart businesses and sector organizations in competitor countries. When they meet with foreign buyers, it is natural that they elevate the perceived benefits of their soybeans and allude to alleged deficiencies of Canadian/western Canadian soybeans. Unless the foreign voices are countered, it is inevitable that their assertions will eventually become implanted in the minds of foreign buyers and result in scepticism about the quality and relative value of Canadian/western Canadian soybeans.

The initial phase in addressing negative assertions from competitors would be development of an image/storyline that describes Canadian/western Canadian soybeans according to the characterizations that western Canadians want and can defend. The image/storyline would include a western Canadian perspective on those characteristics, including protein, that are important to foreign buyers.

Phase two would be the presentation the image/storyline in a document that could be used by exporters and sector organizations when liaising with foreign buyers.

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Soy Canada's Progress Towards 2027 Targets

	2016 Baseline	2018 Progress	2027 Target
Doubling Production in the Next Decade			
Total Seeded Area (Acres)	**5,467,100**	**6,320,100**	**10,000,000**
• Eastern Canada	3,592,100	4,003,000	4,000,000
• Western Canada	1,875,000	2,316,300	6,000,000
Yield (Bushels/Acre)	**44.1**	**42.2**	**48.2**
• Eastern Canada	46.1	49.9	53
• Western Canada	40.1	29.0	45
Total Production (Tonnes)	**6,462,700**	**7,266,600**	**13,000,000**
• Eastern Canada	4,491,200	5,441,100	5,750,000
• Western Canada	1,971,500	1,825,500	7,250,000
Increase World-Leading High-Quality Food-Grade Soybean Production by 25%			
Food-Grade Production (Tonnes)	1,250,000	1,000,500	1,800,000
Food-Grade Seeded Area (Acres)	1,000,000	1,079,000	1,250,000
Increase Competitiveness, Exports and Processing of Commodity Soybeans			
Protein Content (% Dry Matter)			
• Eastern Canada	40.6	N/A	41.1
• Western Canada	38.7	37.2	40.2
Whole Soybean Exports (Tonnes)	4,500,000	6,043,812	10,500,000
Processing Capacity (Tonnes)	1,878,000	2,059,277	2,500,000

2019 AgVocacy Forum in Orlando

Future of Agriculture is in Tech, Innovation

Toban Dyck, Director of Communications, MPSG

SHOULD WE URGE young farmers to pursue an education in agriculture? Or, does that thinking need to better reflect a changing ag sector? If the answer was clear to me before, it certainly isn't now.

A young dairy farmer from Wisconsin pursued an education in computer programming and is now creating software and building apps that has allowed his family's farm to do things a previous generation wouldn't have thought possible.

To advocate is to advocate. Full stop. But, apparently, to advocate on behalf of the agricultural sector is to *ag*vocate. I've always had trouble with this one. The word doesn't roll off the tongue and it comes across as suspiciously crafted—as if part of a larger corporate messaging campaign.

I'm biased toward using words in the dictionary, but, that said, the intentions behind the term agvocacy seem good. And you and I both know agriculture needs strong advocates. So, let's agvocate!

In February, Bayer CropScience flew me to Orlando, Florida to take in their annual AgVocacy Forum. The event, which is routinely scheduled immediately ahead of the Commodity Classic, brought together ag media from across the U.S. and Canada for a day and a half of talks and panel discussions from people across the agricultural production spectrum. It's easy to forget how large this spectrum is.

And if the sector as a whole feels it needs strong champions, it's important to be exposed to just how much diversity is captured by the word 'agriculture.' Hint: there's a lot of diversity in our sector. And it's wonderful.

Produce was represented. Vertical farming was represented. Beef and dairy, too.

But, ultimately, technology ruled the day. There was talk of public trust. There was talk of trade and some subtle jabs at the leader many accuse of casting the first stone that set this whole disruption off. But, mostly, the forum was about technology.

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Phase three would encompass the consistent use of this image/storyline by exporters and sector organizations.

Q – *What's your view on the soybean industry in five years and then 10 years?*

A – In 2016 Soy Canada launched an effort to develop an industry strategic plan that would align the soybean value chain towards achieving ambitious but realistic growth targets over the next decade. After multiple meetings and consultations with representatives from all industry sub-sectors, the strategic plan was finalized and adopted by the board of directors. The plan calls for continued growth between 2016 and 2027 resulting ultimately in 10,000,000 acres of soybeans seeded annually.

Weather-related production challenges in 2017 and 2018 have deferred the rapidity of expansion in western Canada. Nevertheless, it is still anticipated that intensified research and variety development combined with the need for additional crops in rotations and an eventual return to better rainfall will support a renewal and further expansion of acreage.

The table on the previous page outlines Soy Canada's progress towards 2027 targets as outlined in the Strategic Plan. ■

It's clear that the western Canadian soybean market has tremendous room to grow. Our farmers should rest assured that, we at MPSG, are working with groups such as Soy Canada to ensure our farmers and our high-quality soybeans are represented proudly and assertively.

Soybeans in Manitoba is recent history. And it will take time for Manitoba's identity as a dependable, world-class soybean supplier to emerge and command the global attention we know it's capable of. We're on the way there now.

The industry has a few immediate hiccups to overcome, and we don't have all the solutions for them, but we do know—and as Ron pointed out—that soybeans are an excellent and efficient source of protein. The world needs good protein, and at some point that need will likely trump politics and trade wars.

We're grateful for Soy Canada's expertise and we hope you, our farmer members, don't hesitate to contact them or us with any questions you may have.

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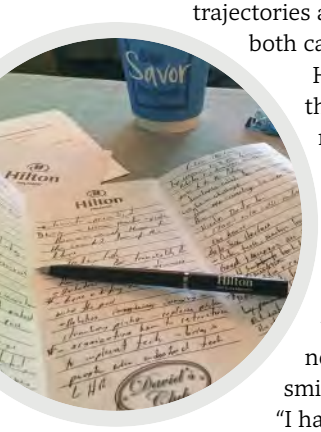
The event was hosted by Clinton Griffiths, anchor at AgDay, and award-winning Canadian journalist Sheila MacVicar.

Dan Basse, president of AgResource, was one of the event's opening speakers. Basse, citing a recent and troublesome trend of decreasing farm revenue, spoke about the need for there to be a demand driver in agriculture, similar to what biofuels were for the U.S. between 2007 and 2014.

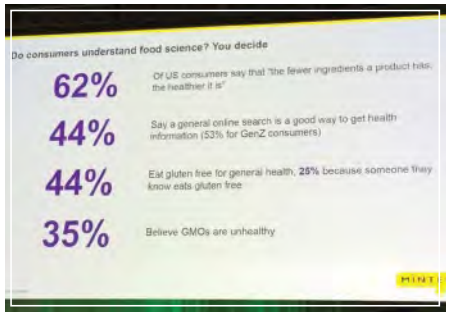
Using an equation that considers population and median income growth, Basse predicts that China and India will drive global demand. The higher the income, the more calories they will require. And both China and India's trajectories are pointing up in both categories.



He also addressed the elephant in the room, referring to U.S. President Donald Trump's relationship with China as a "skirmish." He said this with a subtle, nearly undetectable smirk. I saw it.

"I have to admit. I'm a free trader," said Basse. "I believe free trade has done a lot for the world. We need to bring more people into the middle class through free trade."

According to information Basse presented, the number of people living in extreme poverty has dropped considerably since global tariff and trade agreements evolved after WWII.



Some of AgVocacy Forum speaker Lynn Dornblaser's consumer poll results. The findings were surprising and interesting. There is a gulf between consumer perceptions and science.

Basse's statistics were then taken up by the next speaker, University of Delaware economics professor Dr. Brandon McFadden, who added elements of his own research to reach the conclusion that "The challenge for ag producers is to find ways to add value; move from a homogeneous product to a differentiated product while pleasing the downstream pressures of manufacturers, retailers and consumers."

McFadden said that meeting this demand will be a challenge, as consumers are looking for convenience, though, he argued and this was repeated throughout the forum, they want taste first, then price, then nutrition.

Vonnie Estes is the vice president of technology at the Produce Marketing Association. She took the stage early on day one.

"In 2017, Amazon sold $2B USD in grocery products online in the U.S., up 59 percent year over year. Digital shopping will reach saturation faster than other industries."

According to Estes, the produce market in the U.S. is in need of rethink. Producers need to find ways to implement more technology in their operations, reducing their dependency on a shrinking labour pool and increasing quality and yield.

Estes believes and her data showed that more consumers are buying their food online. Amazon has begun implementing a two-hour grocery delivery service in some test markets. According to Estes, farmers need to be equipped to service this demand.

"What would you say the most important thing is for consumers of the products that they buy?" asked Lynn Dornblaser, the director of innovation and insight at Mintel, a global market research firm. "It has to taste good. In the end, no matter what it is, it's taste that drives consumer choice. "

According to Mintel research, 62 percent of U.S. consumers say that "the fewer ingredients a product has, the healthier it is;" 44 percent say a general online search is a good way to get health information (53 percent for GenZ consumers); 44 percent eat gluten free for general health—25 percent because someone they know eats gluten free; and 35 percent believe GMOs are unhealthy.

The data Dornblaser and Estes presented helped paint a full and intriguing picture of what drives today's consumer.

Carl Lippert is today's consumer and represents a new generation of agricultural producer. His story is fascinating. He is farmer 2.0. Lippert

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The lush grounds of the Hilton in Orlando, Florida was host to many live TV and radio broadcasts during the AgVocacy Forum.

is the co-owner of Grass Ridge Farm in Wisconsin, and co-founder of the app FeedX. Lippert returned to the family farm as a software developer. He sees skills such as his as paramount to farming and agriculture, in general.

"We need to get away from the red barn romantic stereotype of farming," Lippert said. "The opportunities aren't in that. Because that's not going to exist. The opportunities are in building all the tools and the tertiary businesses that help out with agriculture. It might mean not actually starting your own farm, because that's hard and I couldn't in good heart recommend that someone go start a farm today.

"I think that the opportunities in robotics and artificial intelligence, we might have some of the coolest jobs available on the planet coming up. There are a whole bunch of people who care more about the environment; they care more about feeling valuable. Robotics is the opportunity for these people. Ag needs to flex this muscle."

Lippert was able to develop software tools that aggregated many of the data collection points on his farm onto one interface, or, app. This allowed Grass Ridge Farm to better interpret and implement the information their many devices were collecting.

There were many more speakers than what I've referenced here. And they were all interesting.

The veins that connect farmers and those of us working in the industry to a global marketplace are the same once that tie us together domestically. The fruit and vegetable farmers are feeding the world, just like we are. I get the impression that we'd be wise to take their struggles and the struggles of the entire agricultural network seriously.

This event is an important one. It reminded me and everyone else in the room that agriculture changes at a rapid pace. AgVocacy 2018 was very different. While tech was a topic, it was less about the kind of data consolidation that Lippert is doing and more about the seemingly infinite ways the ag sector is able to collect information. It makes sense that the focus would shift to data aggregation and interpretation.

I won't say don't pursue an education in agriculture. And no one at the forum would say that, either. But there is clear value in at least acknowledging the role technology plays in the agricultural sector, as well as the role it could play in bridging the gap between consumers and farmers. ■

Soybean Pod Height

Influence of Genetics, Environment and Management

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

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

SOYBEAN PLANTS POD low to the ground creating harvest difficulties and the risk of yield loss. Harvest difficulties stem from lowering the cutter bar enough to catch the lowest pods, leaving machinery more susceptible to rock and soil intake. Rocks can damage equipment and soil can impact seed quality in the form of earth tag. Out of fear of lowering the cutter bar too much, pods may be left behind on standing stubble at harvest, causing yield loss (Figure 1).

This leads us to question what influences soybean pod height and what we can do about it. This means, we must explore the impact of genetics, environment and management (G x E x M).

Figure 1. Soybean stubble loss at harvest, where pods below the cutter bar remain attached to standing stubble.

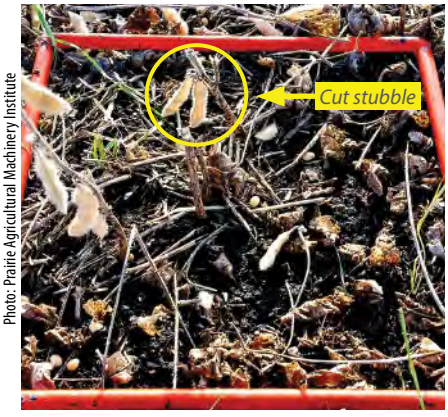

Photo: Prairie Agricultural Machinery Institute

GENETICS

Soybean pod height set, or internode length, is a highly heritable trait. This means genetic advancements can be made by selecting soybean varieties with higher pods. However, a negative correlation exists between lowest pod height and seed yield, meaning there is a risk of declining soybean yield as we select for greater pod height.

Indeterminate soybean varieties that continue vegetative growth after flowering, like those grown here, produce more internodes than determinate varieties. These indeterminate types may continue to elongate their stems for about one month after the start of flowering. Determinate varieties stop elongation about 10 days from flowering.

How do our indeterminate, short-season varieties fair in Manitoba when it comes to pod height? Manitoba Pulse & Soybean Growers (MPSG) conducted research in 2016 to help answer this question. Pod heights were measured on 10 plants per plot at two variety trial locations — Morris and St. Adolphe. A significant interaction between variety and environment was found, meaning varieties behaved differently across locations.

Lowest pod heights ranged from 10.8 to 20.4 cm (4.3 to 8.0 inches), on average, across all varieties at St. Adolphe. At Morris, lowest pods ranged from 9.7 to 17.2 cm (3.8 to 6.8 inches) from the ground. Overall, pods were 0.8 inches higher at St. Adolphe compared to Morris across all varieties. Further analysis is needed to make conclusions between specific varieties. But these preliminary findings confirm pod height diversity exists within our pool of short-season varieties.

Preliminary results also confirm that environmental conditions can inhibit or enhance the ability of certain varieties to reach their pod height potential. For example, the variety that achieved a pod height of 8.0 inches at St. Adolphe reached only 4.8 inches at Morris.

A minimum pod height of 12 cm (4.7 inches), measured as the distance from the soil to the lowest pod-bearing node, is recommended to prevent stubble loss at the cutter bar. At St. Adolphe, 5/67 varieties and 10/67 at Morris had pod heights <12 cm. Considering measurements were made from the bottom of the lowest pod to the soil in these trials, pod heights of our Manitoba-grown varieties were quite good in 2016.

ENVIRONMENT

Knowing that soybean internode length is set from the first node stage until flowering, it is this time period in which environmental conditions may play their role. The common theme from previous research is the influence of temperature and moisture extremes.

In Manitoba, cool temperatures during early growth are often blamed for lower pod height. Limited information is available to confirm this, especially under field conditions. However, cold temperatures can slow soybean development and increase the number of axillary buds.[1] Conversely, hot day/night temperatures (34/26°C to 42/34°C) have been shown to reduce internode length.[2]

Very wet and very dry conditions may also be blamed for lower pod height. Moisture was plentiful at both variety trial sites tested in 2016, but it was especially excessive at Morris where some plots were lost due to waterlogging. Research from Brazil looking at the impact of weather on agronomic factors reported that very dry conditions and widely variable rainfall contributed to lower soybean pod height.[3] However, further investigation is needed to understand the exact influence moisture may have.

MANAGEMENT

A few management factors come to mind when we think about possible influences on pod height, such as planting date, plant population, row spacing, seed depth, tillage, plant growth regulators or harvest methods. Unlike genetics and environment, these are the factors we have the most control over.

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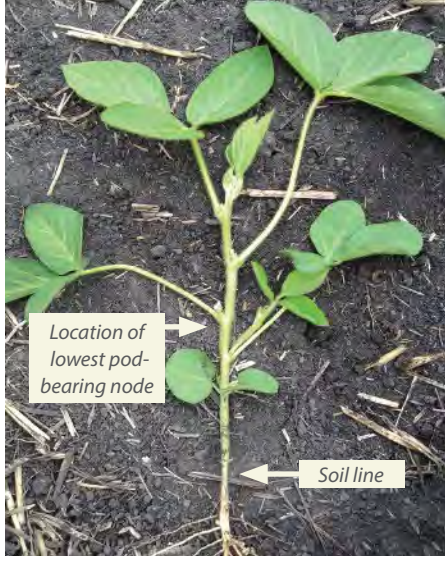
Planting date

Information on soybean pod height response to planting date is available from a University of Manitoba (U of M) study conducted by Dr. Yvonne Lawley and me. In this study, planting date (ranging from April 27 to June 12) did not influence soybean pod height. Lowest pod heights ranged from 9 cm to 14 cm (3.5 to 5.5 inches), on average. However, a significant site-year by variety interaction meant varieties behaved differently at different locations (Figure 2). We can speculate that longer dry periods and variable rainfall during internode elongation at Melita in 2014 and Morden in 2015 may have contributed to lower pod height (Figure 2).

MPSG-funded research conducted by Agri-Skills Inc. at Carman from 2012 to 2014 also found a lack of pod height response to soybean planting dates (May 12 to June 4).

Plant population and row spacing

Information on soybean pod height response to plant population is available from another U of M study conducted by Dr. Yvonne Lawley and me. Results showed that pod height increased with increasing population (Figure 3). For each plant population increase of 1,000 plants/ac (ranging from 46,000 to 298,000 plants/ac), pod height increased by 0.02 cm. However, plant population explained only 21% of this response and there is a great deal of variability in the data, meaning other factors also played a role in pod height set.



Location of the lowest pod-bearing node relative to soil line on a soybean plant.

Another MPSG-funded study conducted by Agri-Skills Inc. examined pod height response to soybean seeding rate (123,000 to 205,000 seeds/ac) and row spacing (8-inch to 30-inch rows). This study found soybean pod height to be unresponsive to both seeding rates and row spacings. Pod height ranged from 2 to 3 inches off the ground overall, depending on the year.

Seed depth

Lowest pod height was measured in a soybean seed depth experiment conducted by U of M/MPSG Research Agronomist Kristen P. MacMillan. At Carman and Arborg in 2018, seed depths ranging from 0.25 to 2.25 inches did not influence pod height. However, pod height was significantly greater at Carman (11.9 cm, on average) compared to Arborg (8.6 cm, on average).

Tillage

An on-farm study conducted by Dr. Lawley and Patrick Walther (U of M) at Haywood and MacGregor in 2016 found pod height differences between corn residue management treatments. Strip-till produced the lowest pods compared to the double-disc, vertical till low disturbance and vertical till high disturbance treatments. However, distance from the soil to the bottom of the lowest pod ranged only from 6.0 cm to 6.9 cm, suggesting this difference is of little agronomic importance.

Research in Brazil found no differences in pod height between soil management treatments in 13/14 site-years. These treatments included no-tillage, reduced tillage, disk plowing plus disking and mouldboard plowing plus disking.[3]

Plant growth regulators

Manipulation of plant hormones, or the use of plant growth regulators (PGRs), may be one possible way to alter pod height. An MPSG-funded study is currently underway by Dr. Belay Ayele (U of M), looking at the impact of PGRs on soybean internode length. This study is focused on three different PGRs applied at different concentrations to soybean varieties with a range of pod heights. Stay tuned for results from this project.

Harvest methods and equipment

Harvest methods and equipment will not influence pod height set, but will they

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Figure 2. Height of the lowest pod-bearing node at Carman, Melita and Morden from 2014 to 2015, averaged across a range of planting dates (April 27 to June 12) and two varieties (23-10RY; 25-10RY) (Tkachuk, 2017).

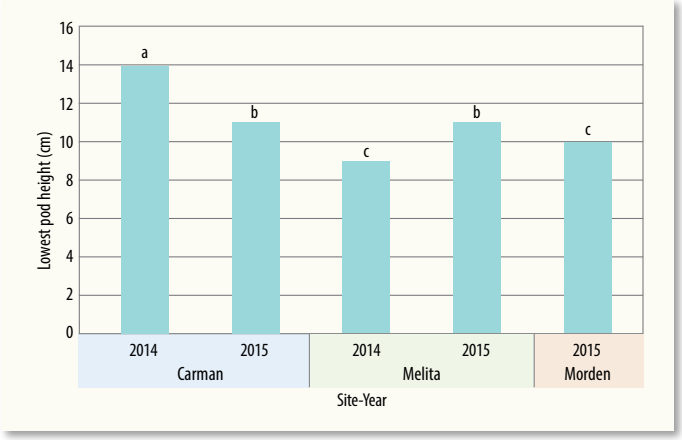
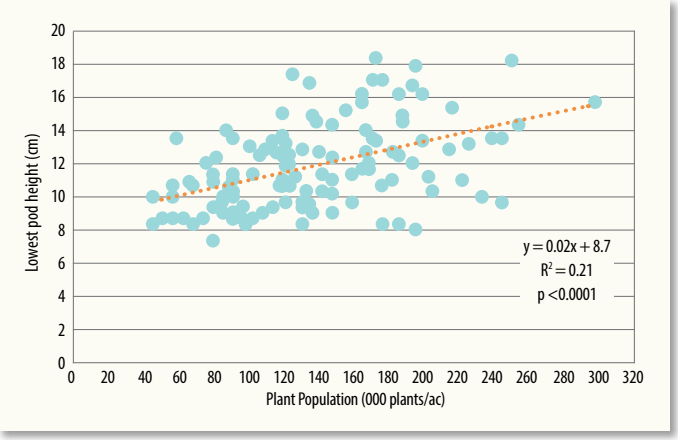


Figure 3. Height of the lowest pod-bearing node response to plant population at Carman, averaged across 2014 and 2015 (Tkachuk, 2017).



The Pea Report

Managing Ascochyta (Mycosphaerella) Blight in Field Peas

Serena Klippenstein, Production Specialist – West, MPSG

ASCOCHYTA (MYCOSPHAERELLA) BLIGHT is the most widespread and economically damaging foliar disease in Manitoba field peas. Infection can lead to reduction in field pea grade, productivity and even seed yield, if severe widespread infection occurs early in the growing season. Of the pea fields surveyed in Manitoba for root and foliar diseases in 2017, mycosphaerella blight was present in all of them.[1] On a scale of 0 (no disease) to 9 (whole plant severely diseased), average disease severity was 4.5 and ranged from 2.7 to 7.2.[1]

DISEASE COMPLEX

The Ascochyta disease complex in Canadian field peas is made up of three fungal pathogens: *Ascochyta pisi*, *Ascochyta pinodes* and *Phoma pinodella*, that together can cause leaf, stem and pod spot, stem lesions and foot rot symptoms.[2] Ascochyta blight, otherwise known as mycosphaerella blight, is the disease caused by *Mycosphaerella pinodes*, the sexual stage of the *A. pinodes* pathogen. It is the most common field pea disease in western Canada.

DISEASE CYCLE

Field peas are the single host crop of mycosphaerella blight, caused by a pathogen that can be stubble-, air-, soil- and seed-borne. *A. pinodes* overwinters on pea stubble and residue, the primary source of inoculum, and can survive on stubble or in the soil as resting spores for many years. Air-borne spores are released and spread by rain splash to plants nearby, or by wind to plants up to several kilometres away. This creates a disease risk even in fields where no field peas have been grown previously.

Plant shoots can also be directly infected through exposure to resting spores in soil or from fungus on seeds that infects emerging seedlings. Foot lesions develop from infected seed, though seed is considered a minor inoculum source and risk of mycosphaerella blight infection transferring from seed to seedling is low.

DISEASE DEVELOPMENT

Cool, wet conditions and short crop rotations encourage the initiation of infection and disease development. Field pea plants are infected throughout the growing season, with the production and release of new spores during wet periods. Mycosphaerella blight progresses upwards from the bottom of the plant, where symptoms appear on lower leaves, branches and the stem. Frequent precipitation and humid conditions in the lower canopy often cause greater disease severity.

Along with weather conditions, timing of initial infection influences the effect of mycosphaerella blight on crop yield. Bloom to early/mid-pod development is the most damaging time for infection establishment.

SCOUTING

Scouting for mycosphaerella blight symptoms in field peas should occur from the 10th node stage (V10) during the vegetative pea stages to the beginning bloom stage (R2) (Figure 1) (see MPSG's *Field Pea Growth Staging Guide* for all field pea stages). This typically occurs from the middle of June to the end of July. Risk of yield loss increases when symptoms

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influence the amount of soybean stubble loss? A local study by PAMI did not find differences in stubble loss between harvest speeds ranging from 2 mph to 5 mph. Stubble loss in this study was very minor compared to other types of seed losses at the header. Research from the 1950s and 60s in the U.S. Midwest reported yield losses of up to 14% for a cutter bar height of 15 cm. However, today's flex headers make it easier to lower the cutter bar and reduce this type of yield loss.

The real risk associated with lowering the cutter bar is rock and soil intake. According to Canadian Grain Commission specifications, the presence of soil in a harvest sample is classified as "foreign material other than grain," of which only 0.3% is allowed for No. 2 Canada soybeans. Rolling is one way to minimize this issue.

SUMMARY

- Genetics play a big role in soybean pod height set. Further genetic selection for pod height must be done carefully to avoid loss of seed yield potential.
- Environmental conditions will dictate whether pod height potential is reached. Temperature and moisture extremes from emergence to flowering are expected to have the greatest influence on this trait.
- Management practices such as planting date, row spacing, seeding depth and harvest speed did not influence soybean pod height. Tillage had little to no impact. Increased plant population may play a role in raising lowest pod height. ■

References

[1] Skrudlik, G. and J. Kościelniak. 1996. Effects of low temperature treatment at seedling stage on soybean growth, development and final yield. J. Agron. Crop Sci. 176(2):111-117.

[2] Hartwell Allen Jr., L., L. Zhang, K.J. Boote and Hauser, B.A. 2018. Elevated temperature intensity, timing and duration of exposure affect soybean internode elongation, mainstem node number and pod number per plant. The Crop J. 6(2):148-161.

[3] Pereira dos Santos, H., R.S. Fontaneli, S.R. Silva, A. Santi, A.C. Verdi and A.M. Vargas. 2015. Long-term effects of four tillage systems and weather conditions on soybean yield and agronomic characteristics in Brazil. Aust. J. Crop Sci. 9(5):445-452.

Figure 1. Field pea at beginning bloom stage (R2).

are higher than the bottom third of the plant canopy by the R2 stage, so any upward movement of symptoms in the crop canopy should be surveyed closely. Scouting is especially important in fields where peas have recently been grown, as disease risk is greater in these fields.

SYMPTOMS

Mycosphaerella blight can infect field pea leaves, stems, flowers, pods, seeds and seedlings, depending on the severity and primary source of disease infection. Symptoms are described as follows:

Minor symptoms

Leaf lesions (Figure 2)

- Begin as small, irregular purplish-brown/black spots or flecks
- Can become large, circular brown/brownish-black lesions with concentric rings (target-like appearance)
- Either one or both types of lesions may be present
- May grow and merge as the disease progresses, covering entire leaves; dry, disease-covered leaves remain attached to the stem
- Flower infection causes blossoms to drop, decreasing the number of potential pods formed

Severe symptoms

Stem lesions

- Purple/bluish-black stem lesions, often at the base of the plant
- May develop below the soil-line on the upper root
- May appear at nodes, elongating 10 mm (3/8 in.) above and below

Foot rot

- Exhibits stem girdling in seedlings
- Weakens the stem when infection is severe
- May cause lodging and premature senescence

Pod lesions

- Small, purplish-black or brown flecks or lesions
- Develop from continuous moist conditions or lodging
- May cause pods to shrink or dry-down early when infection is severe, causing seed quality loss due to seed shrinkage and dark brown discolouration

Due to the similarities between symptoms of mycosphaerella blight and bacterial blight (Figure 3), a blight initiated by the infection of pea seed and uncontrolled by fungicides, proper identification is crucial. Like mycosphaerella blight, bacterial blight symptoms occur on field pea leaves, stems, petioles and pods. However, bacterial blight lesions are typically brown and shiny, have a water-soaked, greasy appearance and can appear translucent.

A detailed resource to distinguish the two diseases is available on the NDSU Carrington Research Extension website.[3]

Figure 2. Small, irregular purplish-brown spots/flecks and circular brown lesions with concentric rings on a field pea leaf infected with mycosphaerella blight.

Photo: Dennis Lange, Manitoba Agriculture

Figure 3: (A) Mycosphaerella blight leaf lesions in field pea (B) Bacterial blight leaf lesions in field pea.

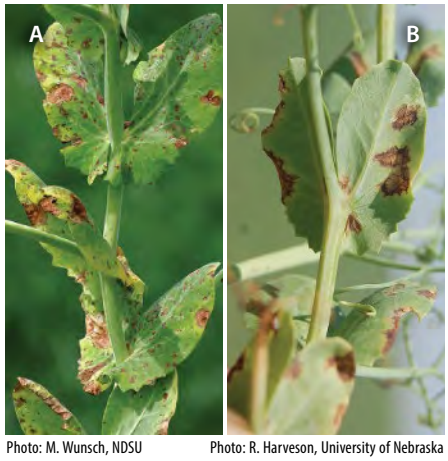

Photo: M. Wunsch, NDSU Photo: R. Harveson, University of Nebraska

Fungicide Decision Worksheet for Managing Mycosphaerella Blight in Field Peas

	RISK FACTOR
Crop canopy	
• Thin – high weed pressure, low yield expectations	0
• Moderate – some weeds, possibly low yield	10
• Normal – about 8 pea plants/ft² or 85/m²	15
• Dense – more plants than normal, lush growth	30
Leaf wetness/humidity/dew at noon	
• None	0
• Low	10
• Moderate	20
• High	40
The five-day weather forecast	
• Dry	0
• Unpredictable	10
• Light showers	15
• Rain	20
Symptoms on pea plants	
• No visible symptoms	0
• Up to 20 percent of plants showing symptoms	10
• 20 to 50 percent of plants showing symptoms	15
• 50 to 100 percent of plants showing symptoms	20
TOTAL SCORE OF RISK FACTORS – *If 65 or more a fungicide application is recommended.*	

Source: K. J. Lopetinsky, Ag Research Division, AARD and S. Strydhorst, University of Alberta, Edmonton, Alberta

FOLIAR FUNGICIDE APPLICATION DECISIONS AND TIMING

Foliar fungicides aim to protect healthy green plant material, but they are unable to reverse symptoms or repair plants damaged by foot rot. Therefore, the application of foliar fungicides before or during the early stages of mycosphaerella blight development can help minimize yield and quality loss from lodging caused by severe stem lesions. However, there are many factors that should be considered before applying foliar fungicide. The new MPSG *Fungicide Decision Worksheet for Managing Mycosphaerella Blight in Field Peas* can be used as a tool to assess fungicide needs according to current crop conditions and disease symptoms. In order to use this tool effectively, crop and disease assessments should occur during bi-weekly field inspections. Also consider expected yield and crop value to justify fungicide cost.

Ideal application timing for foliar fungicide on field peas is beginning bloom (R2). Adequate canopy penetration and leaf coverage during the first application are crucial. Typically, a single fungicide application effectively controls

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mycosphaerella blight. If symptoms spread upward in the crop canopy and moist conditions continue, a second foliar application 10–14 days later using a different fungicide group is warranted. Although resistance to fungicides typically used to control mycosphaerella blight has not been reported in Manitoba, research suggests that insensitivity of *M. pinodes* to the strobilurin (QoI) fungicide pyraclostrobin may be emerging in parts of Saskatchewan and Alberta.[4]

ADDITIONAL CONTROL TIPS

Other mycosphaerella blight management practices should be considered when growing field peas and can be used together with foliar fungicide application. These practices are:

- Follow a minimum five-year crop rotation — or a six- to eight-year crop rotation if risk of Aphanomyces infection is present.
- Grow field pea varieties that have at least 'fair' disease resistance to mycosphaerella blight.
- Use disease-free seed or treat seed with a recommended fungicide if >10% of seed is infected with mycosphaerella blight.
- Avoid planting peas near a previously infected field.
- Work crop residue into field immediately following harvest. ■

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Field Pea Fungicide – On-Farm Network Highlights

on-farm network
PARTICIPATORY • PRECISE • PROACTIVE

MANITOBA PULSE & SOYBEAN GROWERS conducted field-scale On-Farm Network trials to investigate the yield response of field peas to foliar fungicide application in 2017 and 2018. Three trial types were established using replicated strip trials (Table 1). The first trial compared a single application applied at early flower (R2) to no fungicide (untreated). The second trial compared one fungicide application at early flower to two fungicide applications, applied first at early flower and a second application seven to 14 days later. The third trial expanded on this and added untreated strips to compare with both single and double applications.

On average, a single application of foliar fungicide increased yield by 2.7 bu/ac when compared with the untreated check. In the third trial a single, early application of foliar fungicide increased yield by 5.9 bu/ac compared to the untreated.

Yield response to two applications versus a single application of foliar fungicide was dependent on the site-year. Three out of six sites had a significant yield increase for two applications compared with a single, early application. Here, the environmental conditions impacted disease development and the likelihood of a yield response to foliar fungicide applications.

In 2017, dry conditions resulted in low disease pressure and this was repeated in 2018 where the lack of moisture once again limited disease development. Sites with higher rainfall often had higher disease pressure. As mycosphaerella blight is weather-dependent, it is important to evaluate environmental conditions and your own risk tolerance.

These trials will continue in 2019 to assess disease severity across treatments and refine foliar fungicide recommendations. ■

Table 1. Summary of On-Farm Network trials comparing foliar fungicide applications in field peas. Three different trials compared no fungicide, a single application of fungicide applied at early bloom and two applications at early flower and seven to 14 days later.

Year	Rural Municipality	Untreated	Early App	Late App	Untreated	One App – Early	Two Apps – Early and Late	Yield Diff.
					bu/ac			
Trial 1 – Untreated vs. Single Application (Early)								
2017	Montcalm	Untreated	Delaro	–	58.5 b	64.5 a	–	5.4
2017	Rockwood	Untreated	Delaro	–	80.1	82.1	–	2.0
2018	Rockwood	Untreated	Delaro	–	55.9	58.0	–	2.1
2018	Hamiota	Untreated	Dyax	–	72.1	73.3	–	1.2
				Average	**66.7 b**	**70.1 a**	**–**	**2.7**
Trial 2 – Single Application (Early) vs. Two Applications (Early and Late)								
2017	Wallace-Woodworth	–	Delaro	Delaro	–	43.4	43.7	0.3
2017	Rhineland	–	Priaxor	Delaro	–	66.4 b	73.4 a	7.0
2018	Rhineland	–	Priaxor	Dyax	–	52.3	52.5	0.2
2018	Boissevain-Morton	–	Delaro	Delaro	–	70.5 b	73.2 a	2.7
2018	Prairie View	–	Priaxor	Delaro	–	77.7	80.5	2.8
2018	Swan Valley West	–	Headline	Delaro	–	72.4 b	76.7 a	4.3
Trial 3 – Untreated vs. Single Application (Early) vs. Two Applications (Early and Late)								
2017	Roland	Untreated	Delaro	Delaro	48.4 b	56.7 a	60.3 a	–
2017	Two Borders	Untreated	Delaro	Delaro	51.7	55.0	53.0	–
				Average	**50.0 b**	**55.9 a**	**56.7 a**	–

Within each row, yields followed by different letters indicate a statistically significant difference.

Message from Director of Research and Production

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

IT IS CUSTOMARY for the summer edition of *Pulse Beat* to carry a table summarizing MPSG-supported research projects. Two years into a five-year government funding cycle the list has grown substantially.

MPSG has been very successful in leveraging government funding for research projects. Under the current CAP programs 22 of 24 applications to the provincial Ag Action program were approved. As a result, we've initiated about $3.0 million worth of research with an investment to farmers of $1.5 million. Even sweeter has been the federal CAP AgriScience cluster program where MPSG's $2.1 million commitment garnered over $25 million in research. With grower organizations across Canada pooling their funds, Ottawa covers up to 70% of project costs. From an up-front dollars and cents perspective, cost-shared research projects are a "good deal."

While good deals on research are a passion at MPSG, leveraging check-off dollars is only a fraction of the value we seek to deliver to members. After all, research that is well-leveraged financially but leads nowhere agronomically would be a waste. So, then, how do we place a value on research? Often, it's attractive to think in terms of a simple benefit/cost. Unfortunately, it is difficult to track farmer adoption of research results, let alone quantify the rewards farmers have realized as a result. We're left without a reliable numerator in the equation. True, studies show benefit/cost figures for ag research are a handsome 10:1 to 20:1 for Canada as a nation. However, these figures were derived to support policy development not as decision support tools for farmers.

At the end of the day what farmers should expect in return for their research investment (besides a tax credit), is information that is useful to them as farm business operators. Usefulness, then, is something we ought to be able to measure. Here, too, there are challenges because usefulness is in the eye of the beholder.

To get past the murkiness of these questions, MPSG has crafted its own value proposition for research. It goes something like this: investments in research need to be broad enough to serve farmers' widely varying needs to simply stay in the game. On the other hand, investments must also be targeted to cost-saving and profit-generating ways for farmers to win. If the knowledge generated by MPSG-funded research is helping growers stay in the game and reliably deliver wins we've got a useful (and realistic) program.

In the table you'll notice the area of soil health is lagging. In the interest of staying in the game and winning we need to achieve some balance. Soil health and sustainable, winning pulse and soybean crops go together like peas in a pod. The unique sensitivities of pulses and soybeans to soil biological, chemical and physical conditions means there is plenty of useful knowledge to be revealed through research. Several projects in this area are in the proposal stage. As we enter the second half of the five-year funding cycle, soil health will round out the program. ■

2019 Funding Approved for Research

RESEARCHER	PROJECT	START	END	MPSG FUNDING	TOTAL VALUE
	CROP YIELD AND MARKET QUALITY				
MPSG – MCVET	Evaluating Yield, Disease Resistance and Protein in Pulse and Soybean Varieties	1990	ongoing	cost recovery	cost recovery
MPSG – On-Farm Network	Soybean Response to Seeding Rate	2012	2020	OFN	OFN
MPSG – On-Farm Network	Evaluation of Single vs. Double vs. No Inoculation Strategies for Soybeans	2017	2019	OFN	OFN
AAFC – Hou	Evaluation and Selection of Azuki Beans for Adaptation and Production in Manitoba	2017	2019	$108,000	$108,000
AAFC – Mohr	Management Practices to Optimize Establishment and Early-Season Growth of Soybeans	2017	2019	$144,022	$144,022
U of M – Lawley	Cover Crop Strategies for Dry Bean and Soybean Crops in Manitoba	2017	2019	$195,444	$195,444
U of M – Lawley	Predicting Soybean Phenology in Manitoba	2017	2019	$96,400	$192,800
AAFC – Mohr	Sustainable Soybean Cropping Systems for Western Manitoba	2017	2021	$98,325	$196,651
U of M – MacMillan	Soybean Seeding Windows	2017	2019	In 2016, MPSG committed **$400,000** per year for five years to support applied research at the University of Manitoba. Under this program an Agronomist-in-Residence conducts research, extension and student training. Projects are reviewed annually to ensure they align with farmer priorities.	
U of M – MacMillan	Soybean Seeding Depth Assessment	2017	2019		
U of M – MacMillan	Soybean Iron Chlorosis – Variety Screening	2017	ongoing		
U of M – MacMillan	Effect of Preceding Crop and Residue Management on Dry Beans	2017	ongoing		
U of M – MacMillan	Optimizing Nitrogen Rates for Dry Bean Production	2017	ongoing		
U of M – MacMillan	Novel Pulse Cropping Systems	2017	ongoing		
U of M – Lawley	Optimizing the Frequency of Soybeans in Manitoba Crop Rotations	2018	2022	$212,462	$424,925
PAMI	Assessment of Pre- and Post-Emergent Rolling in Non-Stony fields	2018	2019	$113,040	$113,040
AAFC – Hou	Dry Bean Breeding for Early Maturity and Pest Resistance	2018	2023	$728,200	$1,456,000
AAFC – Bing	Dry Pea Breeding for Yield, Pest Resistance and Flavour	2018	2023	$141,800	$2,916,000
AAFC – Cober	Soybean Breeding for Early Maturity and Pest Resistance	2018	2023	$203,920	$2,368,000
AAFC – Cober	Soybean Protein Gene Expression Across Environments	2018	2023	$143,980	$658,000

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RESEARCHER	PROJECT	START	END	MPSG FUNDING	TOTAL VALUE
	CROP YIELD AND MARKET QUALITY continued				
MPSG – On-Farm Network	**Soybean Response to Biological Stimulants**	**2019**	**2022**	**OFN**	**OFN**
MPSG – On-Farm Network	**Soybean Response to Row Spacing**	**2019**	**2022**	**OFN**	**OFN**
MPSG – On-Farm Network	**Evaluation of Inoculation Strategies for Peas**	**2019**	**2022**	**OFN**	**OFN**
MPSG – On-Farm Network	**Evaluation of Inoculation Strategies for Dry Beans**	**2019**	**2022**	**OFN**	**OFN**
MPSG – On-Farm Network	**Dry Bean Response to Nitrogen Fertility**	**2019**	**2022**	**OFN**	**OFN**
MPSG – On-Farm Network	**Intercropping with Soybeans**	**2019**	**2022**	**OFN**	**OFN**
CMCDC	**Intercropping Practices for Yellow Pea**	**2019**	**2022**	**$23,004**	**$92,016**
AAFC – Mohr	**Economic and Environmental Value of Peas and Soybeans in Rotation**	**2019**	**2022**	**$77,760**	**$155,520**
U of M – Brewin	**Economic Analysis Intern Training**	**2019**	**2022**	**$5,000**	**$47,478**
U of M – Stasolla	**Genetics to Overcome Drought and Salinity Effects in Soybeans**	**2019**	**2022**	**$131,220**	**$262,440**
U of M – House	**Overcoming the Discount for Low Protein: Genetics and Environment Effects**	**2019**	**2022**	**$45,880**	**$183,520**
U of M – Oresnik	**A Superior Rhizobium Strain for N-fixation in Soybeans**	**2019**	**2022**	**$177,336**	**$354,672**
MPSG/MWBGA/MCGA	**Tools and Techniques to Manage Extreme Moisture**	**2019**	**2022**	**$120,000**	**$823,000**
	REDUCE THE COST OF PEST CONTROL				
U of M – Gulden	Rotational Effects and Optimized Plant Spatial Arrangement for Wheat Production in MB	2017	2020	$82,800	$349,140
U of M – Costamagna	Determining the Role of Crop and Non-Crop Habitats to Provide Sustainable Aphid Suppression in Soybeans	2017	2019	$107,838	$215,677
MPSG – On-Farm Network	Soybean Response to Fungicide and Insecticide Seed Treatment	2017	2019	OFN	OFN
MPSG – On-Farm Network	Field Pea Response to Foliar Fungicide	2017	2020	OFN	OFN
MPSG – On-Farm Network	Dry Bean Response to Foliar Fungicide	2017	2020	OFN	OFN
MPSG – On-Farm Network	Soybean Response to Foliar Fungicide	2018	2020	OFN	OFN
U of M – Gulden	Optimizing Plant Spatial Arrangement and Weed Management for Dry Bean Production	2015	2019	$236,325	$236,325
AAFC – McLaren	Management of Root Rot in Peas in Manitoba	2018	2020	$150,000	$150,000
BU – Cassone	Improved Integrative Pest Management of Wireworm in Manitoba	2018	2020	$78,545	$157,090
U of M – Entz	Novel Mechanical Weed Control Tools for Integrated Weed Management in Narrow-Row Dry Beans	2018	2019	$115,000	$115,000
U of M – Entz	Control of Late-Season Herbicide Escapes and Volunteer Canola by Selective Cutting Using the CombCut	2018	2019	$27,140	$54,280
AAFC – Vankosky	Prairie Insect Survey	2018	2023	$20,000	$571,000
AAFC – Leeson	Prairie Weed Survey	2018	2023	$25,000	$794,000
AAFC – Leeson	Prairie Herbicide-Resistant Weed Survey	2018	2023	$3,000	$88,000
AAFC – Turkington	Prairie Disease Monitoring	2018	2023	$45,000	$1,360,000
AAFC – Geddes	Glyphosate-Rresistant Kochia – Rotation, Seeding Rates and Row Spacings	2018	2023	$15,000	$1,282,000
PAMI – Landry	Spray Drift Reduction with High-Clearance Sprayers	2018	2023	$30,000	$424,000
AAFC – Mohr	New Crop Rotation Economics	2018	2023	$35,000	$1,300,000
U of L – Le Roy	Economics of Diverse Crop Rotations	2018	2023	$15,000	$351,000
AAFC – Chatterton	Dry Bean White Mould Resistance	2018	2023	$61,900	$619,000
AAFC – Chatterton	Dry Pea Root Rot – Resistance genes, Crop Rotation and Intercropping	2018	2023	$49,100	$1,634,000
U of M – Tenuta	Root Lesion Nematode Survey	2018	2023	$25,600	$854,000
AAFC – McLaren	Prairie Root Disease Survey	2018	2023	$76,600	$888,000
Laval – Belanger	Root Diseases – Genetic Screening Methods	2018	2023	$48,820	$652,000
U of M – Daayf	**Defining Pathogen-Related Soil Quality Targets to Pursue by Crop Rotation**	**2019**	**2022**	**$82,805**	**$331,220**
U of M – Daayf	**Soybean Disease Survey**	**2019**	**2022**	**$75,000**	**$75,000**
AAFC – Geddes	**Integrated Weed Management to Mitigate Glyphosate-Resistant Weeds**	**2019**	**2022**	**$99,522**	**$398,088**
	GROW MARKET DEMAND				
U of G – Duncan	Cholesterol-Lowering Properties of Dry Beans	2018	2023	$183,600	$1,214,000
U of S – Nickerson	Pulse Ingredient Processing for Improved Flour Quality	2018	2023	$116,400	$3,666,000
AAFC – Balasubramarium	Dry Bean Cooking Quality	2018	2023	$15,900	$616,000
RRC – McRae	**Manufacturing Tofu from Dry Beans**	**2019**	**2022**	**$44,092**	**$88,184**
	IMPROVE SOIL QUALITY				
U of M – Lobb	Assessment of the Agronomic and Environmental Impacts of Land Rolling in Soybeans	2018	2019	$85,560	$85,560
U of M – Lawley	Cover Crops – Establishment Windows, Soil Health and Yield	2018	2023	$40,000	$1,502,000
MPSG – On-Farm Network	Field Rolling in Soybeans	2018	2021	OFN	OFN
			On-Farm Network (OFN)	**$430,000**	**$430,000**
			Total Project Funding Commitments	**$5,156,340**	**$31,162,092**

New Projects in Bold

AAFC – Agriculture and Agri-Food Canada
BU – Brandon University
CMCDC – Canada-Manitoba Crop Diversification Centre
LU – Laval University
MCGA – Manitoba Corn Growers Association
MCVET – Manitoba Crop Variety Evaluation Trials
MPSG – Manitoba Pulse & Soybean Growers
MWBGA – Manitoba Wheat and Barely Growers Association
PAMI – Prairie Agriculture Machinery Institute
RRC – Red River College
U of G – University of Guelph
U of M – University of Manitoba
U of S – University of Saskatchewan

Healthy Soil: More Than Just Dirt

Marla Riekman, Soil Management Specialist, Manitoba Agriculture

SOIL IS MORE than its short, four-letter name might imply. Without soil, we have no agriculture, and without agriculture, we have no food. Simply put — without soil, we cannot exist. Soil is so important to us that in 2015 the United Nations Food and Agriculture Organization named it the International Year of the Soil. The key messages were this: soil is the foundation of crop production and the basis for healthy food, soils store water making us more resilient to floods/droughts and help adapt to climate change, and soil is a non-renewable resource that we need to preserve for the long-term sustainability of agriculture.

Soil health is more than just a single measurement of soil quality, but instead is the culmination of the physical, biological and chemical properties of soil. All three properties are required to make a healthy soil — soil physical properties like porosity ensure infiltration of water after a heavy rain, soil microbes are necessary to break down crop residues into organic matter and release nutrients, and cation exchange capacity holds and supplies nutrients for crop uptake. Take away one of these properties and the soil will no longer function as well to support crop growth.

There are a number of soil health measurements, but my favourites are crop growth/yield, soil organic matter and soil structure. These simple, relatively easy-to-obtain measurements say a lot about soil function. Almost every farmer has a yield monitor, and even if no monitor exists, you will certainly know where your poor-yielding areas of the field are. Obviously, something is wrong in those areas, so they give you a good indication that further investigation needs to take place to understand why yield is poor. If you change management and yield goes up in those areas, you can assume that the soil is improving.

If you soil sample regularly, look at the soil organic matter measurement on your soil test. Soil organic matter increases at a relatively slow pace, so you will not see dramatic changes from year to year, but you do want to watch that levels are increasing rather than decreasing over time. Soil organic matter helps to supply nutrients, hold water and improve soil

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structure. Even subtle changes in organic matter levels lead to a healthier soil. Organic matter also aids in soil warming as the soil generally becomes darker in colour as organic matter increases. Tillage breaks down organic matter, so any practices that reduce tillage and increase biomass production will build organic matter over time.

Soil structure is not easily measured through routine lab tests, although some soil testing labs offer aggregate stability analysis. However, you can assess soil structure on your own by using something as simple as your eyes and a spade! Look to see how water ponds on the field after a rain. Does it infiltrate quickly? Or does it erode the soil creating rills and gullies as it runs off? Does the soil form a crust easily as the sun dries out the surface following a heavy rain? It is also very easy to feel the resistance of compacted layers when digging in the field. Take a shovel full of soil and break it up with your hands. Does it crumble easily into smaller chunks or aggregates? Do you see the presence of larger pores made by roots or earthworms that would allow for water movement?

Soil texture is another measure of soil health, but unlike soil structure and organic matter, soil texture is not something that changes with management. Soil texture will influence the overall health of the soil, which is why it is an important measure. You need to know what soil texture you are working with to have a better understanding of how the soil may improve as you make changes to your cropping system. Texture will influence the ability to build soil aggregates — clay particles are microscopic building blocks of soil aggregates, so soils with low clay content (i.e., sands) will be limited in their ability to create stable aggregates. Sandy soils are typically lower in organic matter and do not build organic matter levels as quickly. Sandy soils also have less ability to hold water, so their yield potential will be lower than soil with higher clay content. Since soil texture has a large influence on soil health measurements (such as structure, organic matter and yield), it's important to avoid comparing soil health across soil textures — a sandy loam will not have the same "health potential" as a clay loam, so the same change in soil management will not yield the same level of soil health improvement.

Soil building practices include anything that increases the amount of biomass returned to the soil and decreases soil disturbance. By implementing practices like reduced tillage, cover crops, perennial cover, etc. we will see changes in soil structure, organic matter and crop growth and yield. However, these are long-term changes that will require long-term solutions — soil health will not improve overnight! With long-term solutions, our soils will become more resilient to flood and drought conditions, better able to withstand wind and water erosion, and remain more productive for future generations. ■

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FABA BEAN GROWTH STAGING GUIDE

VE *Emergence*

Epicotyl pushed through the soil.

VS *Scale leaves*

Two scale leaves present above or below-ground on the main stem.

V1 *First leaf*

First unfolded bifoliate leaf and above-ground node.

V2 to Vn

Second unfolded bifoliate leaf, third unfolded bifoliate leaf, fourth, etc.

R1 *Flower bud*

Flower buds present at one or more nodes.

R2 *Beginning bloom*

First flowers open.

R2.5 to R3 *20–50% bloom*

Flowers open halfway up the main stem. Occurs 7–10 days after beginning bloom.

R4 *Flat pod*

Flat pod at one or more nodes.

R5 *Full pod*

Green seeds fill the pod cavity at one or more nodes.

R6 *Beginning maturity*

Leaves and lower pods start to turn yellow.

R7 *Mid-maturity*

Lower pods are dark brown/black, seed moisture is 30%.

R8 *Full maturity*

Most pods are dark brown/black, seed moisture is 20% or less.

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May 2019

Dig Up Those (Dry Bean) Roots!

An update from the soybean and pulse agronomy lab

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

Figure 1. This root has about 10–15 nodules (scoring 3 out of 4) but they are pink, green and brown. Pink nodules are actively fixing nitrogen, while green and brown nodules are not and are a sign of inefficient fixation.

DIGGING UP ROOTS… is this part of your routine crop scouting? You could be counting nodules on soybean roots or checking for clubroot in canola, but what about other crops and conditions? Digging up roots and inspecting them can be just as valuable as observing the crop above ground. Plant roots form an extensive network with soil, interacting with microbes, water and nutrients to produce biomass and yield. We should ask ourselves — how are they functioning? Can our management system improve them?

In the soybean and pulse agronomy research lab, we are studying nitrogen, preceding crop and residue management in dry beans at Carman and Portage. Digging up roots is standard protocol for collecting data on nodulation and root rot to help explain research results. Here's how you can make observations about dry beans in your fields.

RESEARCH BACKGROUND

Nitrogen fertilization at an average rate of 60 lbs N/ac is standard practice for dry beans in Manitoba. Dry beans are managed like a non-legume crop in most production regions because they are inefficient at producing their own nitrogen (N). On average, they acquire <45% of their N requirements through biological fixation[1], which is a particularly intricate process in dry beans and dependent on factors such as environment, market class, variety and inoculant. Our current N recommendations are based on research from the early 2000s — what are N dynamics and requirements in dry beans today?

In 2017, a dry bean nitrogen fertility study was established at Carman and Portage to determine the optimum N rate for Windbreaker pinto beans and T9905 navy beans. To date, three site-years have evaluated rates of 0, 35, 70, 105 and 140 lbs of applied N/ac. Interestingly, the only statistically significant yield response is to the highest rate of N and when return to N ($/ac) is calculated, no N fertilizer addition is economical. Another experiment evaluating the effect of preceding crop (wheat, canola, corn or pinto beans) and residue management (tilled vs. direct seed) on pinto bean production was also established. Both of these studies have contributed to interesting observations that will advance our dry bean production systems in Manitoba and western Canada.

ROOT NODULES

Pinto and navy beans start flowering 45–60 days after planting which usually falls during the second week of July. This is also the time you are likely weighing the decision of a fungicide application, which can be aided by scouting just prior to flowering for observations on the plant canopy and soil moisture conditions. Digging up roots and checking for nodulation should be done after that — during flowering through early pod formation. The goal is to provide a general indication of whether or not functional nodulation is occurring and the severity of root rot. Identifying nodule presence and function is a starting point for future nitrogen management decisions. The majority of dry bean farmers are not scouting for or accounting for nodulation, and this makes sense since they are a fertilized crop and inoculants are not used (previous research has supported these management decisions). However, based on our current research evaluating nitrogen management and studying dry beans in general, we should re-visit this.

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Figure 2. Root samples with range of root rot severity from 1 to 4 (L–R) out of 9, where 1 = good plant and root growth, with few small lesions infecting <5% of lower stem area and 4 = lesions scattered over the lower stem and roots infecting 25–50% of the area. These would not be considered a major limitation to yield.

Figure 3. Root samples from the same plot show a range of root rot severity from 1 to 5 and another root condition: compaction – can you see the distinct lateral root growth on two of the roots?

In dry beans, nodulation and root rot rating scales are not correlated to productivity or yield but provide a relative indication of performance. For example, higher nodulation scores and good colour equals greater potential for biological nitrogen fixation (Figure 1). Higher root rot scores, on the other hand, indicate reduced root growth that is likely limiting resource uptake and yield potential. Since you are likely checking nodulation in a field that was fertilized, dry beans are less likely to invest energy into forming nodules. So don't be surprised if you don't find any, and be pleasantly surprised if you do! The rhizobia or N-fixing bacteria required to form nodules on dry bean roots is *Rhizobium phaseoli* — we usually introduce crop-specific rhizobia to the soil through inoculants but dry bean rhizobia is native to our soils, and may already exist in your fields. For example, in the nitrogen fertility experiment (seed was not inoculated), nodules were present in both navy and pinto beans at two out of three site-years, and the number of nodules was reduced as N rate increased. The overall scores were relatively low (<2 out of 4) which could be related to the dry conditions, but begs the question "is nodulation impacting their response to added nitrogen?". Inoculants have been tested in the past with little success and have not been widely commercially available. This past extension season, however, I connected with two companies and will be testing two bean inoculants on pinto, navy and black beans in a new experiment at Carman this year.

ROOT ROT

You may not find nodules, but you will probably find root rot. Over the past five years, root rot has been found in 100% of surveyed fields in Manitoba[2], although the incidence (% plants affected) and severity of affected plants varies (Figure 2 and 3). Results from the 2018 preceding crop and residue management experiment show that the crop preceding dry beans affected root rot severity but residue management did not. Beans following beans and wheat had more severe root rot (2.8 out of 9) than beans following corn (2.5 out of 9) while beans following canola had a similar average score (2.7 out of 9) to all other residue types. That being said, overall root rot scores were relatively low — pathologists consider a severity of greater than four out of nine to limit yield, which is when symptoms are present on 50% or more of the root system. Depending on the year, 30–93% of surveyed fields have a mean root rot score of >4, making root rot a major cause of yield loss in Manitoba dry beans. Keep in mind that root rot can attack throughout the season and should be part of regular crop monitoring — this mid-season assessment may not take into account seedlings that were lost to seedling blight or damping off earlier in the season.

What root rot pathogen is present? This is nearly impossible to identify with visual observation but it is most likely *Fusarium* spp. Looking again at the annual survey results, *Fusarium* spp. are detected in 100% of surveyed fields, followed by a much lower occurrence of *Rhizoctonia* and *Pythium*. There is currently no complete resistance to root rot in dry beans, but screening among AAFC pathology groups is ongoing in collaboration with the dry bean breeding program at Morden. At this point, if you find severe root rot in your field, consider bean field history, seed quality, fungicide seed treatment, environmental conditions and management practices that promote optimal growth.

Follow along with our research results as you evaluate your dry bean fields and tag me on Twitter (@kpmacmillanUM) with your root observations. ■

DIGGING UP ROOTS IN JULY DURING FLOWERING

In at least five locations of the field, dig gently about six inches around and below plants. Gently pull and shake loose soil. Use a bucket of water to wash the remaining soil off the roots. Ask yourself the following questions when observing the roots:

FOR NODULATION

- Are nodules present? How many?
- A rating scale[3] of 0 to 4 is commonly used where 0 = no nodules, 1 = ≤5, 2 = 6–10, 3 = 11–20 and 4 = >20.
- What colour are they? Use your thumbnail to cut them open – pink nodules are healthy and functional and should predominate over green or brown ones.

FOR ROOT ROT

- Is there brown discolouration to the lower stem and roots?
- How is extensive is root development?
- Various ratings scales are used to generally assess overall plant and root growth, and proportion of lower stem and roots infected with lesions.
- A rating scale[3] of 0–9 can be used were 0 = no visible lesions, 1–2 = 5–10% of infected area, 3–4 = 25–50% infected area, 5–6 = 50–100% infected area and growth hampered, 7–8 = growth severely hampered, little or no roots and 9 = plant dead.

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Herbicide Resistance in Manitoba

Tammy Jones, Industry Development Specialist – Weeds, Manitoba Agriculture

PALMER AMARANTH, TALL waterhemp, Canada fleabane... the scientific community continues to document the development of herbicide-resistant weeds with confirmation of resistance to new modes of action or multiple mechanisms within one weed. Weedscience.org collects data on the global number of unique cases of resistance, with the current total at 499 unique cases involving 23 herbicide modes of action. That is quite startling since there are only 26 known modes of action in herbicides.

It seems that most of agriculture is aware of the threat of prolific, competitive weeds like Palmer amaranth, and the significant impact it is having on crop production in the U.S. That being said, Palmer amaranth has not been reported in Manitoba to date. So while we wait for emerging threats, there are some local herbicide resistance issues that may not be getting the attention they deserve.

There is no denying that weeds continue to evolve and adapt to current crop production practices. Not only does that result in shifts in the predominant species in Manitoba, but it also means an increase in the mechanisms of herbicide resistance and fewer herbicide options to effectively manage those populations. Wild oat has been a consistent concern for Manitoba. Group 1 resistance was first confirmed in Manitoba back in the early 1990s, and over time, levels of Group 1 resistance have climbed. Based on the most recent herbicide-resistant weed survey done in 2016, in fields where there are wild oats, over 75% of those fields have Group 1 resistance. In 2015, prairie researchers confirmed a Manitoba wild oat population was resistant to five modes of action (Groups 1, 2, 14, 15, and 8). In fact, there is resistance to six known sites of action in wild oat in Manitoba, making us a global leader in herbicide-resistant wild oat. It has been predicted that western Canada is very likely to develop glyphosate resistance in wild oat, which would add even greater complexity to this already challenging weed.

I've spent the winter of 2018/19 talking about glyphosate-resistant kochia. After initial confirmation in Manitoba in 2014, there were five municipalities with confirmed resistant populations in 2016 and 12 municipalities by 2018. This is actually under-reporting the extent of the issue, due to a lack of testing and a limited data set. Not only does this weed tumble and spread resistant seeds, it is an out-crossing species, so pollen flow contributes to the spread of this problem.

Recent herbicide screenings of suspected Group 2 resistant redroot pigweed have confirmed a substantial increase in occurrence. Group 2 resistant redroot pigweed was first confirmed in the province in about 2002. In 2016, the weed survey only detected Group 2 resistant pigweed in one of 22 fields that were tested based on random selection. This past summer, pigweed was challenging to control and subsequent sampling of problem fields confirmed resistance in four of the five fields. Anecdotally, there was more than one area struggling with this issue, which warrants further investigation. There were also two types of pigweed in the fields sampled, redroot pigweed and then what has been tentatively identified as Powell amaranth. While there are a number of reasons for difficulties in controlling pigweed (environment, staging, and so on) herbicide resistance seems to be another key factor to consider.

DEFINING HERBICIDE RESISTANCE

A common definition of herbicide resistance is the inherited ability of a plant to survive and set seed after an application of a normally lethal dose of herbicide. At a purely scientific level, resistance can be any statistical difference between a susceptible population and a resistant population, but at the field level that may still mean that a typical use rate kills the weed. So in the field, "normal" use rates are more relevant, but can vary from region to region based on the herbicide label. It makes it challenging to draw a line in the sand on what level of resistance actually determines that a weed should be classed as "resistant".

With many weeds, the level of resistance is so high, that these arguments are irrelevant, but it does add complexity to the issue. When a scientist is identifying a new type of herbicide resistance, a susceptible population is grown in comparison to the suspect

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population, a dose-response curve is generated to demonstrate the level of resistance and the genetics are usually investigated. That dose-response curve allows scientists to determine a rate of herbicide that differentiates susceptible biotypes from resistant biotypes, which is useful when screening populations in the future. Resistance testing involves collecting seed, growing it and exposing the seeds/plants to the differentiating rate of herbicide. There are many methods; petri dishes of herbicide solution, agar plates infused with herbicide or growing out plants in pots and spraying them. Just like assessing control in a field situation, a visual assessment is the ultimate judgement.

SCOUTING FOR HERBICIDE RESISTANCE

Herbicide resistance is a numbers game. A one in a million occurrence seems rare until you think about the number of weeds in a patch and the number of times that you spray those weeds. If only one or two weeds survive, it is unlikely that anyone would notice. Typically, a patch in a field that won't die is the first

sign of herbicide resistance. And scouting is so important. After determining that weeds are at the right stage, and a herbicide is applied at the right rate under the right conditions, assessing that herbicide application 14–21 days is the first opportunity to notice herbicide resistant weeds (or rule out other factors). A general indication of herbicide resistance is a significant variation in herbicide effect within a small area of similarly sized weeds that does not have a pattern (pictured above)—i.e., not a sprayer miss, not a nozzle issue, nor an environmental influence.

MANAGEMENT OPTIONS — MANY TINY HAMMERS

Herbicides continue to be an important tool for weed management, even when there is herbicide resistance in a field. However, there are many cropping practices that help with the efficacy of the herbicide. A competitive crop, established in narrow rows with good plant densities, and appropriately-placed fertilizer will favour the crop rather than weed growth. Timing herbicides when weeds are small and more readily controlled is important, and this typically means more than one spray application for flushing weeds like kochia (or someday waterhemp). Hand rogueing, inter-row tillage, tillage of patches and silaging a crop can be effective in minimizing seed set, when herbicide-resistant weeds are no longer effectively managed with herbicides. Harvest weed seed management is another option for minimizing contributions to the weed seed bank. As herbicide resistance issues develop, we need to incorporate more of these tools into our arsenal. ■

Weeds to Watch for in Manitoba

Tammy Jones, Manitoba Agriculture and Robert H. Gulden, Department of Plant Science, University of Manitoba

* NWA – The Noxious Weeds Act of Manitoba • Tier 1 – all plant parts must be destroyed • Tier 2 – destroy or control based on the size of infestation • Tier 3 – control required for infestations causing harm

WILD OAT

Features	Caution
• Annual C3 plant • No auricle, with hairs on the leaf margin • Panicle with up to 250 awned seeds • Up to 4 ft. tall • Seeds can remain dormant in the soil for up to eight years	• #4 on the 2016 Manitoba Weed Survey • Prefers cool weather and moist soil • Confirmed multiple HR in Manitoba to Groups 1, 2, 8, 14, 15 and 25 • 10 plants/m^2 can reduce wheat, barley and canola yields by 10% and flax yields by 20%

KOCHIA (Tier 3 NWA*)

Features	Caution
• Annual C4 plant • Hairy alternate leaves • Inconspicuous flowers that outcross or self-pollinate • 6 in. to 6 ft .tall • Roots can penetrate up to 10 ft. • Can germinate throughout the summer and produce 15–30,000 seeds/plant	• 21 plants/m^2 can reduce wheat yield by 33% • Commonly HR to Group 2 with known Group 4 HR biotypes and widespread HR to Group 9 in Manitoba • Drought and salinity tolerant

REDROOT PIGWEED

Features	Caution
• Prolific annual C4 plant • Dull green alternate leaves • Rough stem with taproot root structure • 1 to 3 ft. tall • Seed viable for five years • Germinates at high temps (20–30°C) and will germinate late in summer with adequate soil moisture	• Group 2 HR biotypes in Manitoba • Alternate host for many insect pests • Under hot conditions can quickly advance beyond recommended stages for herbicide application • Indicator species of high nitrogen soils

BIENNIAL WORMWOOD

Features	Caution
• Annual or biennial plant • Smooth hairless stem with sage-carrot odour • Leaves pinnately divided and redivided • Up to 6 ft. tall • Highly competitive and prolific, producing up to one million seeds per plant • Germinates in the spring, summer or fall	• #20 on the 2016 Manitoba Weed Survey • Invades pastures, ditches and crop land • Tolerant to most pre-plant incorporated and pre-emergence herbicides

LAMB'S QUARTERS (Tier 3 NWA*)

Features	Caution
• Annual C3 plant • Alternate leaves with white mealy particles (wax) • 2 to 3 ft. tall • Germinates at low temps • Averages 72,000 seeds/plant and seeds can survive 30–40 years	• #14 on the 2016 Manitoba Weed Survey • Triazine-resistance (Group 5) is common in Ontario • 200 plants/m^2 can reduce barley yield by 20–25% • Produces oxalic acid that is poisonous to sheep and swine in large amounts

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TALL WATERHEMP (TIER 1 NWA*)

Features	Caution
• Dioecious[2] annual C4 plant with high genetic diversity • Smooth stem with glossy leaves • Up to 8 ft. tall • Produces up to 500,000 seeds/plant • Germinates throughout the summer especially in reduced-tillage systems that leave seeds at the soil surface	• Growth rate is 50–70% greater than many other annual weeds • Confirmed HR in North Dakota[3] • Multiple HR biotypes involving Groups 2, 4, 5, 9, 14, 15 and 27

GIANT RAGWEED (TIER 3 NWA*)

Features	Caution
• Annual C3 plant native to North America • Stems somewhat hairy • Large opposite leaves, except at ends of branches, mainly 3- or can be 5-lobed, small upper leaves not lobed; leaf surface rough (like sandpaper) • 16 in. to 13 ft. tall	• Easily selected for Group 9 HR • A single plant produces up to one billion pollen grains • 1 plant/m² can reduce crop yields by 45 to 77%

PALMER AMARANTH (TIER 1 NWA*)

Photo: NDSU

Features	Caution
• Dioecious[2] C4 plant with high genetic diversity and aggressive growth • Hairless stem • Alternate ovate leaves with petioles longer than the leaf • Produces up to one million seeds per female plant • Up to 7 ft. tall • Germinates late winter until fall	• Confirmed HR in North Dakota[3] • Very competitive • HR to multiple Groups including 2, 3, 5, 9, 14, 15 and 27

COMMON RAGWEED (TIER 3 NWA*)

Features	Caution
• Annual C3 plant • Compound finely-divided leaves • Distinctive inflorescence – seed at the base of long clusters of male flowers • 6 in. to 5 ft. tall with a long taproot • Produces 3–60,000 seeds which can persist for 80 years	• Easily selected for Group 9 HR • Important cause of hay fever, producing a large amount of pollen that can move > 125 miles • Strong accumulator of N, P, K and many micronutrients • Seed survives digestion (contaminates manure)

YELLOW FOXTAIL

Features	Caution
• Annual C4 plant • May be highly branched (many tillers) • Leaf has long hairs at the base and margin surface • Flowers are dense spike-like panicles with yellow bristles • Up to 3 ft. tall	• #6 on the 2016 Manitoba Weed Survey • Prefers warmer regions • Causes yield reductions of 16% in wheat, 11% in oats and 15% in soybeans • Biotypes with HR to Groups 1 and 2 or HR to Group 5

[1]HR – herbicide-resistant [2]Dioecious – produces separate male and female plants

[3]See NDSU's new factsheet *Identification, Biology and Control of Palmer Amaranth and Waterhemp* (W1916)

Combine Cleanout

How to reduce the risk of soybeans in your field peas.

Dennis Lange, Industry Development Specialist – Pulses, Manitoba Agriculture

Soybeans are hard to clean out of peas. How many do you see in this photo?

Answer at the end of the article.

COMBINE CLEANOUT CAN be a time-consuming endeavour. It is a necessity in today's world with food allergens, herbicide-resistance weeds and other potential pests such as soybean cyst nematode. It has been stated by multiple sources that there is roughly 150 lbs of plant bio-material found inside and outside of the combine after harvest. All this material can be a source of contamination if soybeans were the last crop harvested. Soybean growers who also grow peas have an added challenge since soybeans are one of the last crops harvested for the year and peas are the first crop harvested the following year. This doesn't always allow for farmers to run another crop through the combine to help flush out any unwanted soybeans in the sample. This article will address a few key points on combine cleanout.

Combine cleanout should start in the fall before you leave the field and once you have finished harvesting your soybeans. Doing this cleanout in the fall allows you start the following year with a clean machine for your peas. The goal of the in-field cleaning is to remove any material that is loosely hanging on or inside the machine. The use of a gas-powered leaf blower or portable air compressor can be used to accomplish this task. Before starting this task, open up all trapdoors including the clean grain, tailings elevator, stone trap and unloading auger sump. Next, run your unloading auger empty for approximately two minutes to clean out any beans that could be lingering in the auger. Now, run the combine with the sieves wide open and with the wind turned up for approximately two minutes. It's also a good idea to open and close the sieves electronically to help loosen anything stuck in the sieves. You can also drive the combine over slightly rough ground to loosen any material inside the combine while running the combine.

Once that step is complete, shut down the machine and clean the flexheader.

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Remove any shields before starting the cleaning procedure. Use the leaf blower or compressed air to blow off any soil or debris that may be on the header including cleaning of the knife. After that is complete, remove the header and then move to the feeder house. Blow out any material that is inside the feeder house and pay attention to the corners. Finally, do a walk around the machine blowing off any unwanted material. Upon completion of this step, shut down the machine, close up the trap doors and reinstall any shields before heading home for the second and more thorough cleaning.

When you clean the combine you should start from the front and top of the combine, moving down and towards the back. This will keep the clean areas clean. Before starting the cleaning procedure open all the trapdoors and shields. This will help you access any areas where plant bio-material can be found. When you are back at the yard, start cleaning at the header. Clean off any material still adhering to the knife guards and any material still hanging on the header. After you're done, remove the header and then move to the feeder house.

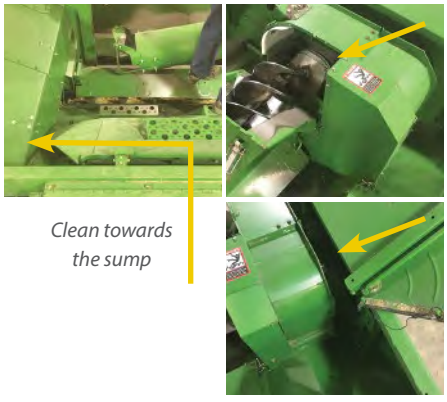
Figure 1

The feeder house (Figure 1) can be a major source of material contamination. Once the feeder house is clean, move to the stone trap and blow out any material that is hanging in there, paying particular attention to any corners where material can adhere to the combine (Figure 2).

Figure 2

Now it's time to move to the top of the combine and grain tank. When cleaning the grain tank you should always blow the material towards the unload sump. Pay close attention to areas of the hopper such as the auger and areas behind the auger where material can accumulate (Figure 3). Before you move down to the threshing area, blow off the top of the cab. The threshing area, concave and

Figure 3



rotor/cylinder, can be key points where plant material can accumulate. Blowing out plant material can be a bit time-consuming but is well worth the effort in order to reduce the risk of contamination of soybeans in your peas (Figure 4).

Figure 4

Pay attention to any horizontal augers and the clean grain, and return elevators. Finally, inspect and clean the sieves (Figure 5).

Figure 5

One area that can be challenging to clean out is the unloading auger. If your unloading auger has a screen installed, remove it to gain better access. If this is not an option, another alternative is to use wood shavings packed into the unload sump and then running the auger to help to flush out any soybeans still in the auger. This should be done once the hopper has been cleaned of soybeans. The bulkiness of the material will help to move the soybeans through the auger. A bag of wood shavings is about 9 cu. ft. before compression, and can be purchased at most feed supply stores for $6–8 per bag.

In summary, a thorough combine cleanout starts in the fall when soybean harvest is completed and before the combine leaves the field. Do your initial cleanout in the field to remove all loose material on the outside of the combine. Open all doors and traps, run the machine empty for two minutes with lots of wind and run the unload auger empty to remove as many of the beans as you can before doing your cleanout out back at the yard.

Once you are back at the yard, start from the front and then move to top of combine and then down and out the back of the combine. That way cleaned areas will remain clean. Use a gas-powered leaf blower and/or compressed air to clean out the machine. Finally, clean out the unload auger by packing wood shavings in the unload sump and running the auger to flush out any of the last of the soybeans.

If you have the ability to harvest a crop such as wheat, oats or barley before doing peas that will also help in flushing out any soybeans that may be left in the combine. Doing these steps will help you to reduce the chance of soybeans ending up in your harvested pea sample and both you and your buyer will be happy. ■

Answer: There are seven soybeans in the pea sample.

IMPORTANT INFORMATION FOR PULSE GROWERS

The success of the Canadian pulse industry relies on the ability to export the pulses produced in Canada. The demands of the end user are becoming increasingly complex. The chart on the last page of this document outlines the regulatory impediments to market access that can arise from using certain crop protection products. In addition to meeting our customers' science-based regulatory requirements, Canadian pulses must also meet the requirements of consumer acceptance. In addition to meeting government regulations on food safety which govern trade, buyers of Canadian pulses will reflect consumer acceptance of various production practices.

WHAT ARE THE CROP PROTECTION PRODUCTS TO PAY ATTENTION TO THIS SEASON?

For pulse crop production in Western Canada, products that may pose market risks include diquat (Reglone®), glyphosate (Roundup®), saflufenacil (Heat®), glufosinate (MPower® Good Harvest®), flumioxazin (Valtera™), carfentrazone (Aim®, CleanStart®), and chlorpyrifos (Lorsban™ and other trade names).

WHAT ARE THE RISKS OF USING THESE PRODUCTS?

Late-season applications of fungicides, insecticides, pre-harvest weed control products, or desiccants may result in residue levels found in the seed. Growers must take appropriate risk mitigation steps to ensure product residues remain below maximum residue limits (MRLs) set by regulatory agencies.

IMPORTANT INFORMATION REGARDING THE PRE-HARVEST APPLICATION OF GLYPHOSATE ON ALL PULSE CROPS

The pre-harvest application of glyphosate is important for three reasons:

1. Glyphosate use in general and specifically pre-harvest use is under increased scrutiny by customers of the Canadian pulse industry.
2. Pre-harvest glyphosate must only be applied to pulse crops when seed moisture content is below 30% to avoid residue levels greater than the maximum allowable limit.
3. A growing number of markets are testing pulse imports for glyphosate residues.

In order to keep our export markets open, it is imperative to follow the application rate and timing as indicated on the label of glyphosate-based crop protection products. **Glyphosate is registered for pre-harvest weed control. Glyphosate is not a desiccant nor is it a tool to speed up crop maturity or dry-down. Pre-harvest glyphosate must only be applied to pulses when seed moisture content is below 30% in the least mature plants in the field. When using glyphosate in a tank mix with other products such as saflufenacil (Heat™), glyphosate and the tank mix partner must still be applied when seed moisture content is below 30% in the least mature plants in the field.**

WHAT CAN YOU DO TO MITIGATE RISK?

Ensure product residues remain at trace levels or levels well below accepted maximums by following these steps:

1. DO NOT EXCEED THE PRODUCT'S LABELLED RATE

Application guidelines for individual pesticides are set to allow growers to properly use the product. Guidelines assume that the labelled rate is not exceeded. Exceeding the labelled rate increases the risk of surpassing recognized MRLs and this can have serious consequences in terms of international acceptance of the crop.

2. TIME THE APPLICATION ACCORDING TO THE LABEL

Labels are very specific in terms of crop staging. Follow label instructions and apply crop protection products only at the recommended crop stage.

3. CONSULT WITH YOUR EXPORTER/PROCESSOR ABOUT WHICH CROP PROTECTION PRODUCTS ARE ACCEPTABLE IN INTERNATIONAL MARKETS

Exporters/processors have a good sense of which markets may be sensitive to specific products, and may restrict their purchases to crops that conform with buyer specifications.

4. CONSULT THE CHART ON THE FOLLOWING PAGE INDICATING MARKET CONSIDERATIONS AND STATUSES FOR SPECIFIC PRODUCTS, OR VISIT WWW.KEEPINGITCLEAN.CA

MARKET CONSIDERATIONS FOR USE OF PULSE CROP PROTECTION PRODUCTS – MARCH 2019 UPDATE

CROP PROTECTION PRODUCTS	PEAS	LENTILS	CHICKPEAS	DRY BEANS	FABA BEANS	COMMENTS
A. Pre-harvest weed control						
Glyphosate (e.g. Roundup)	**ATTENTION!** Pre-harvest glyphosate must only be applied to pulse crops when seed moisture content is below 30% to prevent residue levels greater than the maximum allowable limit.					Product is restricted to pre-harvest weed control and is not registered for use as a crop desiccant. Consult with your exporter/processor before using this product for certain crops/destinations. MRLs are established in key markets. However, MRLs are set at very low levels for dry beans in the EU, and all pulse crops in South Korea.
	✓/!	✓/!	!	!	!	
B. Desiccant						
Diquat (e.g. Reglone)	!	!	!	!	!	Consult with your exporter/processor on pulse crops destined for the US. MRLs are established in key markets but are set at low levels in the US.
Saflufenacil (e.g. Heat)	✓	✓*	✓	✓	✓	MRLs have been established for all major export markets. This product is not registered for pre-harvest use on green lentils.*
Glufosinate (e.g. MPower Good Harvest)	NR	!	NR	NR	NR	Consult with your exporter/processor before using this product. MRLs are established in the EU and Japan, but not in the US or at CODEX.
Carfentrazone (e.g. Cleanstart, Aim)	!	NR	!	!	!	Consult with your exporter/processor before using this product. MRLs are established in the EU, US and Japan, but not at CODEX.
Flumioxazin (e.g. Valtera)	!	!	!	!	!	Consult with your exporter/processor before using this product for certain crops/destinations. MRLs are established in key markets, however, MRLs are set at low levels in the EU.
C. Other crop protection products						
Chlorpyrifos Insecticide (e.g. Lorsban, other trade names)	NR	✓/!	NR	NR	NR	If applied according to label rates early in the crop year at vegetative stage or during flowering, there's no need for caution. In cases of late-season application during pod development or seed fill to maturity (e.g. for late-season grasshopper control), consult with your exporter/processor.
Benzovindiflupyr Fungicide (e.g. Elatus, Solatenol)	✓	✓/✋	✓/✋	✓	✓/✋	For dry beans and peas, MRLs have been established for all major export markets. For chickpeas, lentils, and faba beans, CODEX MRLs have not been established. If applied according to label rates and only early in the crop year (e.g. single application at 0-20% flowering,) there are no export marketing issues. For chickpeas, lentils, and faba beans, do not apply later than the 20% flowering stage.

- ✓ No regulatory issues.
- ! Know your market. There is at least one market where MRLs are not established. Consult with your exporter/processor.
- ✓/! No regulatory issues when applied according to label. Always consult with your exporter/processor prior to application.
- ✋ Do not use after 20% flowering.
- NR Not registered. Only use registered product.

ALBERTA PULSE GROWERS · SASKATCHEWAN pulse Growers · MANITOBA Pulse Soybean GROWERS · OBG ONTARIO BEAN GROWERS

White Mould Fungicide Efficacy Research

Michael Harding, Alberta Agriculture and Dr. Syama Chatterton, Agriculture and Agri-Food Canada

***SCLEROTINIA SCLEROTIORUM* (LIB.)** de Bary is a filamentous fungus that causes above-ground disease symptoms on many field and horticultural crops. This pathogen is so omnivorous that there are over 60 disease names on more than 300 plant species. In many cases, Sclerotinia diseases are difficult to manage and the effects are highly destructive. As a result, this pathogen is responsible for millions of dollars in crop losses annually.

One of the most damaging diseases caused by *S. sclerotiorum* is white mould on dry beans (Figure 1).

This disease cycle begins in June or July when dense, melanized resting structures in the soil (called 'sclerotia') germinate to form small mushroom-like structures called an apothecia. The apothecia forcibly discharges ascospores which become airborne, and drift short distances on the wind, hoping to find a suitable host tissues to colonize. Senescing bean flower petals are the most commonly exploited initial food source in bean fields, and once growing on a decaying petal, the fungus can begin attacking green tissues like leaves, stems and pods. The fungus must kill the host tissues in order to absorb nutrition from the plant, and it can move quickly through the crop. This is why infections can appear suddenly and be highly destructive. As the dead tissues are consumed, the fungus produces more sclerotia which eventually drop to the soil and remain inactive until suitable conditions coax them out of dormancy.

Two of the main pillars of crop disease management are crop rotation and disease resistance and many diseases can be successfully managed with these two tools. Unfortunately, these two are not sufficient for management of white mould because of the pathogen's extremely broad host range, ability of sclerotia to survive dormant in soils for two to five years, and the lack of resistant germplasm available to plant breeders. As a result, fungicide applications are a critically important in managing white mould.

The fungicide vinclozolin was the *go-to* product for managing white mould on dry beans for many years, until 2005, when it's use on beans was revoked by Health Canada's Pest Management Regulatory Agency. Over the next 10 years after the loss of vinclozolin, many new fungicides were registered for control or suppression of white mould in Canada. The products varied in active ingredients, and in price. Naturally, bean growers wondered if they varied in efficacy, so we evaluated seven registered fungicides in side-by-side comparisons in replicated, small-plot trials for three years at Brooks, AB.

The results of the three years are shown in Figure 2.

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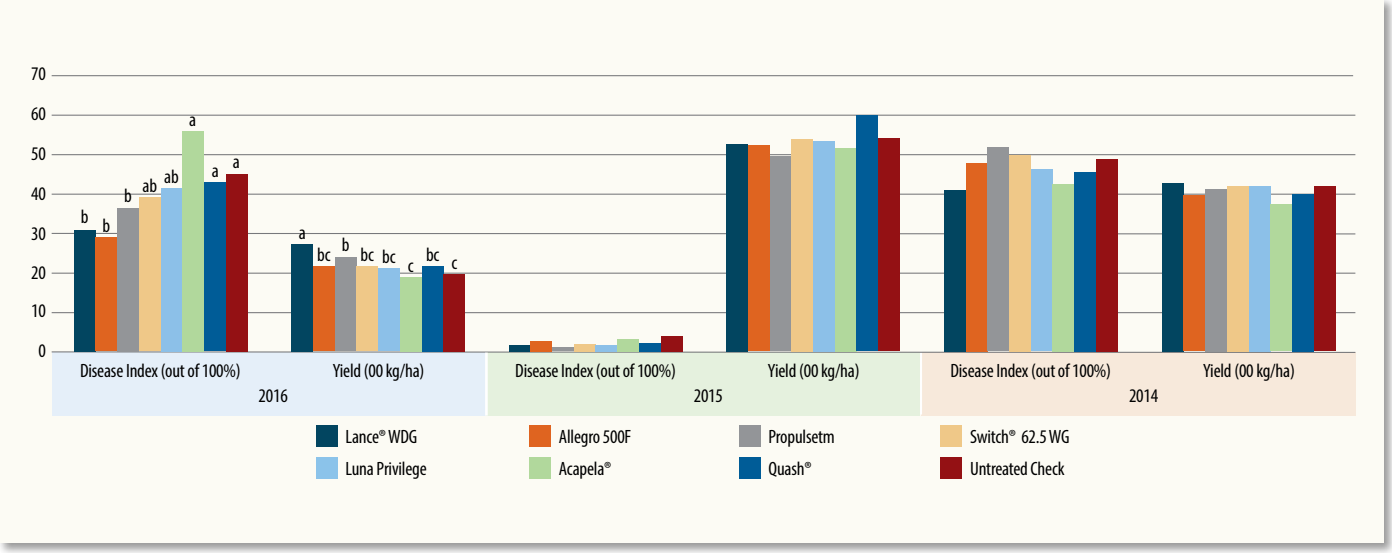
Figure 1. White mould symptoms include fuzzy white fungal growth (A) and dead patches in the bean canopy late in the season (B).

Figure 2. White mould disease index and dry bean yield after one application of each of seven fungicides in three consecutive years. Results are means from a replicated complete block design experiment in small plots with four replicates.



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Our studies confirmed much of what we already know:

1. Weather (primarily rainfall) is the primary driver of white mould incidence and severity.
   a. In 2016 there was plenty of rainfall and therefore high levels of disease leading to low yields. In 2016 there were significant yield responses to fungicide applications.
   b. In 2015, a dry year, there was very low disease pressure and very high yields. There was very little response to fungicide application and no statistically significant differences.
   c. In 2014, the season was dry early, but turned wet late. As a result, high levels of mould developed near the end of the season, but yields were only affected by small amounts. Additionally, there was no significant yield responses to fungicide applications.
2. Treatments with the lowest disease did not always have the highest yield, indicating that factors other than white mould were contributing to yield.
3. Lance was a top performer at reducing disease in all three years, regardless of the environment. All the other fungicides varied in performance depending on the environmental conditions. There were no statistically significant differences between fungicides in 2014 or 2015.

These results indicated that there were some years that fungicide applications were not needed because there was little to no disease pressure. Similarly, there were some years where disease came late enough that yield loss was small, and a fungicide application during the bloom period did not protect against any yield loss. Finally, there were years where disease potential could cut into yield potential, and a fungicide application was well worth the effort. It is during these years (like 2016) where a fungicide application can protect as much as 800 kg/ha in yield.

Finally, it is important to keep in mind that the data presented here is only three site-years of data, only one of which had significant disease pressure that threatened yield. As a result, major decisions regarding fungicide selection should be made cautiously. All of the fungicides showed the ability to reduce disease and/or improve yield, and in two of the three years there were no significant differences between them. Therefore, it is recommended to first focus on the decision to spray or not, and the timing of the application, since they will be much more important than which fungicide is chosen.

When considering these results, and other information that is known about white mould, some recommendations are:

1. Always employ foundational cultural practices to minimize risk, such as good crop rotation (three-year break between highly susceptible crops like beans, sunflowers and canola), and choosing cultivars with the best tolerance or ability to avoid disease.
2. Some years may not require a fungicide, but always be ready to apply one. It's easier to call off an application last minute than it is to initiate one.
3. Monitor white mould risk as the crop is coming into flowering (humidity and rainfall) to help determine the current risk.
4. Check weather forecasts regularly to know if a rain event is forecast.
5. When it appears that the environment could drive disease potential to the point that it may threaten yield potential, one or more fungicide applications can protect against yield loss to white mould.
6. If you really want to know if your fungicide made you money, leave an untreated check strip that allows you to calculate how much yield/money you gained (or lost) with your fungicide application.
7. Keep detailed records for each field. Over time, these records may help you predict risk for individual fields. ■

MPSG's On-Farm Network Highlights

FOLIAR FUNGICIDES HAVE been evaluated for pinto and navy beans at nine sites in the On-Farm Network since 2016. A single application of foliar fungicide was applied at R2 (early pin bean) and compared with an untreated control. On average, a single application of foliar fungicide on dry beans significantly increased yield by 55 lbs/ac when compared with the untreated check. With low rainfall in recent years, white mould disease pressure has not been severe in these trials. Monitor weather conditions as flowering approaches to determine your white mould risk. To aid in spray decisions, refer to MPSG's *Fungicide Decision Worksheet for Managing White Mould in Dry Beans* at manitobapulse.ca. ■

Lentil Reproductive and Maturity STAGING GUIDE

USE THIS GUIDE to help identify lentil staging for proper application of pesticide products and harvest management strategies.

For all harvest management strategies, (desiccation, pre-harvest glyphosate, swathing) timing is critical for maximizing yield, minimizing quality concerns and ensuring grain is marketable.

Assessing seed maturation in an indeterminate crop like lentils is challenging. Immature seeds are generally in the top third of the canopy and can be much more immature than those in the lower canopy.

The optimal stage to implement harvest management strategies for lentils is when most seeds have reached physiological maturity. This occurs at 30% seed moisture content.

To assess the crop stage, walk along a transect through a representative field section and randomly sample pods from the entire canopy (bottom to the top of plants). A minimum of 50 pods should be sampled. Seed should then be shelled from the pods and the representative seed sample assessed.

Glyphosate should only be applied on lentils when the crop is at less than 30% seed moisture with a pre-harvest interval of seven days. Applying pre-harvest weed control or desiccation products at the incorrect stage can result in elevated residue levels, poor seed quality and can adversely impact the marketability of your lentils.

To determine if lentils are at 30% moisture, ensure that 80% of the plant is yellow to brown in colour. This applies to the entire field including the greenest part. If parts of the field are less mature, they should be avoided at application time or the field should be left to mature for a couple days.

To see the full *Lentil Reproductive and Maturity Staging Guide* visit manitobapulse.ca.

Stage	Description	Details
R1	Early bloom	• One open flower at any node on 50% of the plants in the field
R2	Full bloom	• Flowers have opened on nodes 10–13 of the main branch on 50% of the plants
R3	Early pod	• Pods on nodes 10–13 of the main branch are visible on 50% of plants in the field
R4	Flat pod	• Pods on nodes 10–13 of the main branch are flat • Seeds fill less than half of the pod area, but can be felt as a bump between the fingers
R5	Full seed	• Seeds in any single pod on nodes 10–13 of the branch are swollen and completely fill the pod cavity
R6	Full pod	• All the normal pods on nodes 10–13 of the main branch completely fill the pod cavity • Field remains green
R7	Physiological maturity	• Moisture content of 30% or below • 80% of the plant is yellow to brown in colour • Top of plant may still have slight green colour, but seeds fully formed and not juicy • Seeds in pods from the bottom third of the plant are tan-brown, hard, and pods rattle when shaken • Seeds from the middle third are full size and firm with 100% colour change (light green to tan-brown) • Seeds from the upper third have 50–75% colour change with no immature seeds (shiny green seeds)
R8	Full maturity	• 90% of the pods on the plant are tan-brown • Seed moisture ranges from 20–30%
	Ready to harvest	• All pods are tan-brown and seed moisture is less than 20%

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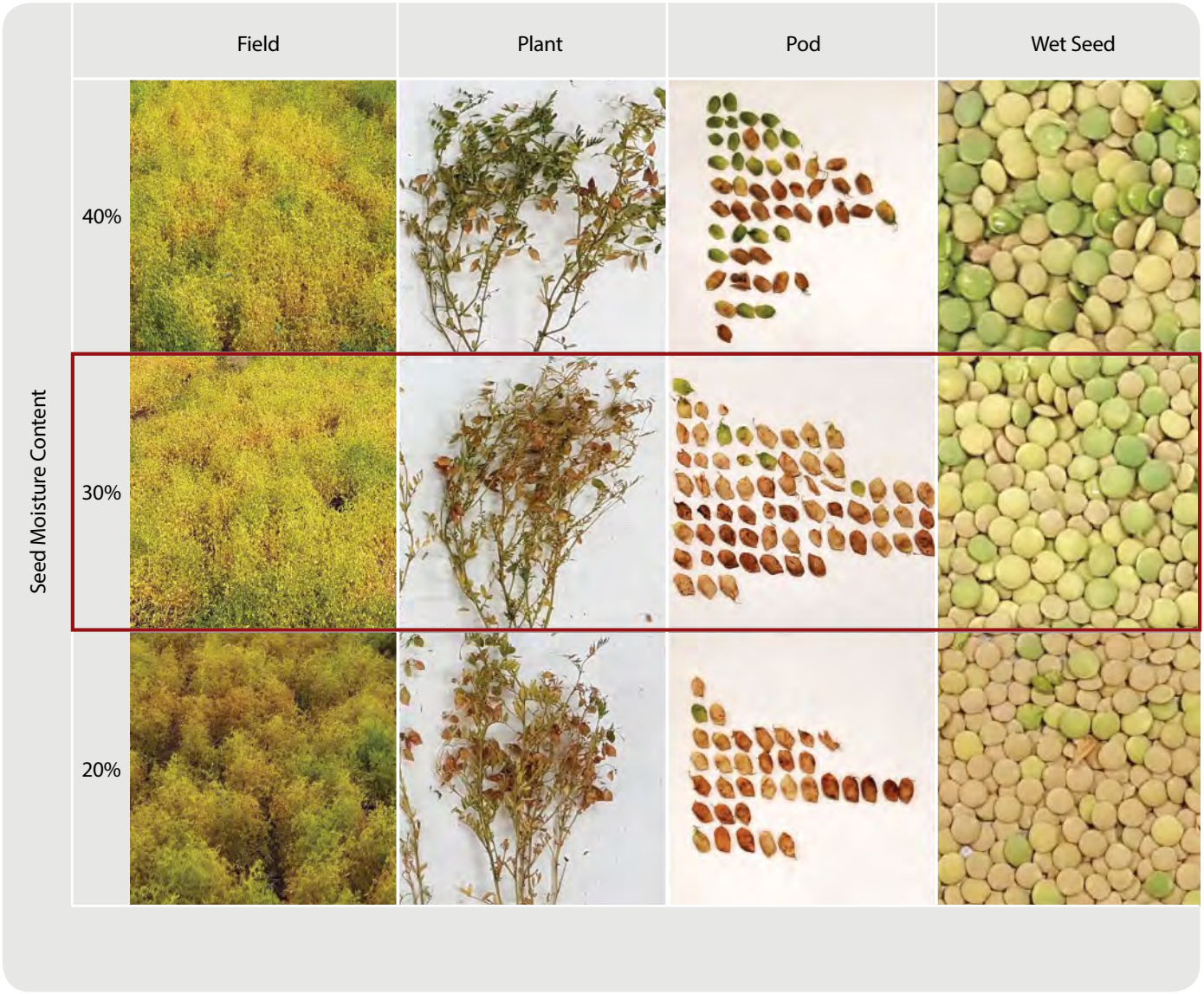
HERE IS HOW TO KNOW WHEN YOUR LENTILS ARE AT 30% MOISTURE



Flowering

Flat Pod

Full Pod

Resistance to Phytophthora Root and Stem Rot in Soybean

Debra L. McLaren, Robert L. Conner, Yong Min Kim and Maria A. Henriquez, Agriculture and Agri-Food Canada

ROOT AND STEM rot caused by *Phytophthora sojae* is a devastating disease of soybean crops worldwide. Soybeans are the primary host for this pathogen, which can infect the plants any time from planting to harvest. Development of diseased plants late in the season is directly related to the level of genetic resistance present in the soybean variety. Those with high susceptibility will develop a diagnostic chocolate-brown canker at the base of the plant extending up the stem, which often occurs with extensive root rot.

In this host-pathogen system, there are major resistance genes known as ***Rps*** (***R**esistance **P**hytophthora **s**ojae*) genes. They provide host resistance to *P. sojae* known as race-specific resistance, which is usually conditioned by a single gene (*Rps*). More than 20 different major resistance genes have been reported but only a few have been deployed in soybean cultivars. The *Rps* genes that have been used in soybean cultivars in Canada and the United States include *Rps1a*, *Rps1b*, *Rps1c*, *Rps1k* and to some extent *Rps3a* and *Rps6*. In Manitoba, short-season soybean varieties carrying the genes *Rps1c*, *Rps1k* and *Rps3a* are currently available.

As with other host-pathogen systems with a gene-for-gene interaction, there are many pathotypes or races of *P. sojae*. A pathotype describes a variant of a pathogen that can overcome a specific combination of *Rps* genes. Pathotypes are identified by inoculating a *P. sojae* isolate on a series of differential cultivars that each carry different *Rps* genes. In initial surveys of *P. sojae* in soybeans conducted prior to 1990 in Ontario, Canada and the United States, simple pathotypes were identified, which were able to defeat only one or two *Rps* genes. Over time, isolates with a greater degree of complexity began to emerge with some able to cause disease on soybean cultivars with several *Rps* genes, and different pathotypes have been reported within the same field. Since deployment of *Rps* resistance genes remains the most effective and economical means of managing *P. sojae* in soybean, the importance of surveys for assessing the diversity of isolates cannot be overemphasized. Surveys of Manitoba soybean fields for this disease have been conducted since 2014. In 2018, the survey continued with the collection of soil and diseased plants from soybean fields across Manitoba and the recovery of isolates of *P. sojae*. Research is in progress to characterize those isolates for their ability to cause disease on soybean cultivars with the common *Rps* genes used today and

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provide information on the pathotype diversity that now exists.

Partial resistance, also known as quantitative resistance, field resistance or tolerance, is a non-race specific resistance and is conferred by several minor genes. This type of resistance has become increasingly important in regions where a high level of diversity and complexity in the populations of *P. sojae* have overcome many of the *Rps* genes. Partial resistance is expressed in plants after the cotyledons and first true leaves are visible and is characterized by lower levels of root rot, disease progression at a much slower rate than occurs in susceptible cultivars and the absence of stem rot symptoms. When diverse pathotypes are present, partial resistance has been shown to provide protection. Although *Rps* gene resistance is expressed in the seed and therefore is effective from germination onwards, partial resistance is not. When there is a high risk of disease development, then seed treatment fungicides have increased yield in partially resistant cultivars. Significant differences between treated and non-treated seed for both moderately resistant and moderately susceptible cultivars have been reported when disease pressure is high, indicating that partial disease resistance requires the use of seed treatments for early season protection in highly favourable environments.

Symptoms of Phytophthora root and stem rot in soybeans with the diagnostic brown lesion that progresses up the stem.

Utilizing host resistance is considered to be the most effective and stable means for management of this disease. If effective *Rps* genes are available, they will provide complete protection from seeding to harvest. There is a strong potential that newer or uncommon *Rps* genes can provide effective management of the pathogen, but their deployment should occur in combination with partial resistance. Since more genes are involved in the expression of partial resistance, partially resistant cultivars are more difficult to develop. However, where individual fields may harbour a large number of pathotypes, a combination of *Rps* gene and partial resistance provides the best protection because, to date, no single *Rps* gene has been shown to confer resistance to all *P. sojae* isolates and new virulent pathotypes of *P. sojae* that can overcome *Rps* genes continue to emerge. Current research efforts for the development of more durable management of this disease include the identification of new *Rps* genes as well as a better understanding of the mechanisms that contribute to the expression of quantitative disease resistance. The authors thank Manitoba Pulse & Soybean Growers and the Canadian Agricultural Partnership for their ongoing financial support of the field surveys of the pathotypes of *P. sojae* in Manitoba. ■

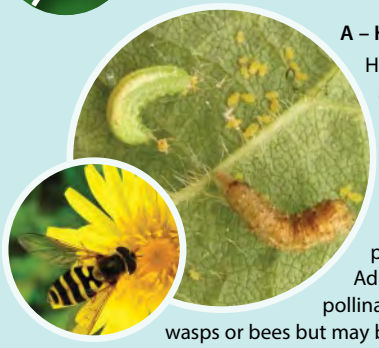
Do you have a production question related to pulse or soybean crops?

Maybe you're looking for an opinion or advice?

Write to us!

Email Cassandra Tkachuk
cassandra@manitobapulse.ca
or
Serena Klippenstein
serena@manitobapulse.ca

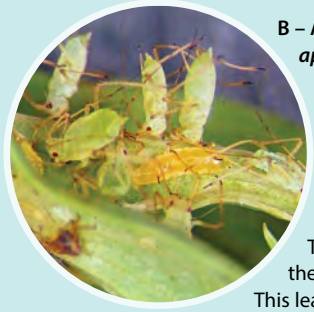
Soybean Scout ANSWERS



A – Hover Fly Larvae

Hover flies, also known as syrphid flies, are beneficial insects in both the adult and larval forms. One hover fly larva can consume as many as 400 aphids by swinging its head side to side. Larvae are 10–15 mm long and may be yellowish green to pale brown in colour with pale stripes. Adult hover flies (inset) are important pollinators. Adults are often confused with wasps or bees but may be distinguished by the way they hover around flowers. The presence of hover flies should be considered in insect management decisions. Visual inspection or a sweep net can be used to detect adults and larvae.

Photos: Jon Gavloski, Manitoba Agriculture



B – Aphid Midge Larva (*Aphidoletes aphidimyza*)

Aphid midge larvae, also referred to as Aphidoletes, are predators of more than 60 species of aphids. Larvae are tiny (about 3 mm long), slender and pale to bright orange in colour. Adults are mosquito-like brown flies. These larvae prey on aphids by piercing the body and sucking out the contents. This leaves a blackened aphid shell attached to leaf. Aphidoletes is one of many beneficial species present in Manitoba that should be considered in aphid management decisions. Visual inspection is recommended, although its aftermath may be easier to find than Aphidoletes itself.

Photo: Whitney Cranshaw, Colorado State University

Manitoba Pulse and Soybean Buyer List – May 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	✓
CHS Inc.					✓	204-942-3796	Inver Grove Heights, MN	✓
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 Organic Trade Solutions Ltd.	✓	✓	✓	✓	✓	306-563-7815	Regina, SK	
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.

Recipe Corner

Middle Eastern Chickpea Salad with Za'atar

Servings: 4 Prep time: 25 minutes Total time: 25 minutes

Za'atar

1 tsp (2 mL) fresh thyme, chopped
1 tsp (2 mL) oregano, chopped
1/2 tsp (2 mL) sumac
2 tbsp (30 mL) toasted sesame seeds
Salt/pepper to taste

Chickpea Salad

4 cups (1000 mL) cooked **chickpeas** (canned can be substituted)
1 English cucumber seeded and diced
1 cup (250 mL) cherry tomatoes sliced in half
1 cup (250 mL) Jben cheese or feta cheese
1/2 cup (125 mL) diced red onion
1 tsp (2 mL) chopped fresh garlic
1 tsp (2 mL) Dijon mustard
1/4 cup (62.5 mL) olive oil
1/4 cup (62.5 mL) lemon juice
1 tsp (2 mL) ground cumin
1/2 tsp (1 mL) ground clove
1/2 tsp (1 mL) ground nutmeg
1/2 tsp (1 mL) ground coriander

Method

1. Combine the thyme, oregano, sumac, toasted sesame seeds, salt, pepper and set aside for the salad topping.
2. Whisk together the Dijon mustard with lemon juice and slowly add the olive oil. Whisk in garlic and then all of the spices, season with salt and pepper and set aside.
3. In a separate bowl, combine the diced cucumber, sliced tomatoes, diced onion, Jben cheese and chickpeas.
4. Pour dressing over mixture and adjust seasoning if necessary. Top with za'atar and enjoy!

Spicy Lamb and Black Bean Meatballs with Minted Greek Yogurt

Servings: 4 Prep time: 25 minutes Cook time: 20 minutes Total time: 45 minutes

Meatballs

1 lb (454 grams) ground lamb
1 can (432 grams) **black beans** (drained) or 200 grams cooked
1 cup (100 grams) oats
1 tsp (15 mL) Dijon mustard
2 tbsp (60 mL) ketchup
1 tsp (15 mL) paprika
1 tsp (15 mL) cayenne
4 cloves garlic minced
1 egg
1/2 cup (125 mL) diced red onion
1 tsp (15 mL) fresh chopped rosemary
1 tsp (15 mL) fresh chopped oregano
1 tsp (15 mL) fresh chopped thyme

Minted Yogurt

2 cups (500 mL) Greek yogurt
1 tbsp (30 mL) torn mint
1 juiced lime
Fresh cracked pepper to taste

Method

1. Preheat oven to 375°F.
2. Place black beans in food processor with ketchup and pulse until a coarse texture has been achieved then set aside.
3. Place ground lamb in a large mixing bowl. Add the egg and Dijon mustard and mix until incorporated.
4. Add the remaining ingredients, however, be careful not to overmix.
5. Finally, incorporate the bean and ketchup mixture and season with salt and pepper.*
6. Once proper seasoning has been satisfied, form the balls into desired size. 50–75 gram portions per ball is recommended.
7. To cook the meatballs place in a 375°F preheated oven until browned and fully cooked, approximately 20 minutes. To serve, top with the minted Greek yogurt or enjoy with your favourite summertime green leaf salad!

**Please note – It's always best to cook a small portion of the mixture to test the seasoning prior to forming the balls.*

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

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[1] Saskatchewan Pulse Growers, 2017. [2] Manitoba Agriculture, 2017.

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AKRAS R2
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LONO R2
2450 CHU I 00.5 RM

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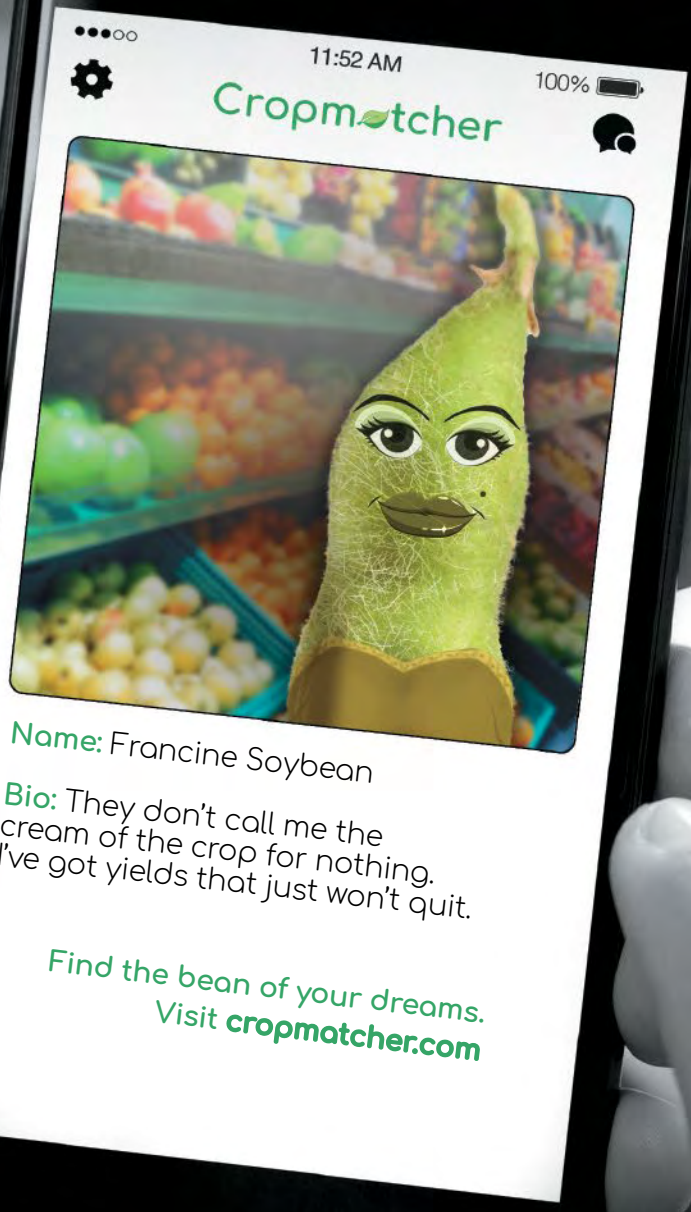

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