



*Advancing Agriculture through Research*

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Advancing Agriculture through Research

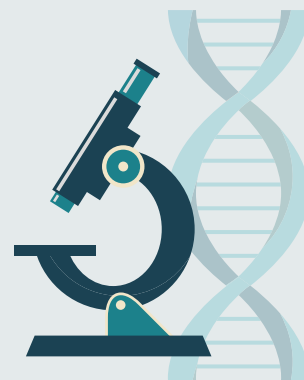
Investing in crop research to benefit western Canadian grain farmers

**\$210M**

INVESTED IN RESEARCH  
SINCE 1981

**\$53M**

IN RESEARCH FUNDING  
OVER NEXT FOUR YEARS



**\$24M**

in infrastructure and tools to help  
organizations conduct research



**\$8M**



to establish Research Chairs at the Universities  
of Alberta, Saskatchewan and Manitoba



Dr. Linda Gorim



Dr. Maryse Bourgault



Dr. Mario Tenuta

**\$1.1M**

in Graduate Student  
Scholarships since  
2011 to develop the  
next generation of  
researchers



Brianna Zoerb  
U of S



Dustin Maclean  
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Berenice Romero  
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### ELEVATING INSECT RESEARCH

New research facility gets proactive on pests



# CHAIR AND EXECUTIVE DIRECTOR'S MESSAGE



DR. KEITH DEGENHARDT  
Chair, WGRF



GARTH PATTERSON  
Executive Director, WGRF

**It's time to reflect on another successful year of funding crop research to benefit western Canadian grain farmers. At the Western Grains Research Foundation (WGRF), we continue to invest in both single-crop and multi-crop research in the priority areas of variety development and production.**

We also continue our efforts to accelerate crop research. Through our Capacity Initiative, equipment, buildings and people are now in place across Western Canada to increase research capacity for many decades. We have

highlighted several of these investments in the pages ahead, with more to come in 2022.

## **Keeping a finger on the pulse of crop research needs**

The Future Field Crop Research Needs process was launched in January 2021 and completed in November, as part of WGRF's 40th anniversary. We began by gathering views on changes in crop production and issues affecting farmers today and tomorrow. **We now have established priorities to guide the organization when funding cross-cutting crop research.** Read more about this initiative on page 16.

## **Transferring knowledge to support production**

Knowledge transfer is another key priority for WGRF. This year, we showed continued support for the Canadian Agronomist, Prairie Pest Monitoring Network, and Field Heroes. A first-of-its-kind *Pests & Predators Field Guide* received tremendous support from industry influencers with orders for print copies and digital downloads beyond expectations.



“Many thanks to the Board of Directors, whose wealth of farming experience and commitment to research continues to be an asset for WGRF.”

## Looking ahead to 2022

As we look ahead to 2022, we expect to continue to participate in processes with the Agriculture Funding Consortium (AFC), Agriculture Development Fund (ADF), Ag Action Manitoba (AAM), Canola Agronomic Research Program (CARP) and others. Preparation for the next Canadian Agricultural Partnership cluster programming is underway and we anticipate being involved in a number of clusters once again.

As always, many thanks to the Board of Directors, whose wealth of farming experience and commitment to research continues to be an asset for WGRF. The dedication and commitment of the WGRF staff is also greatly valued and appreciated. In the year ahead, we look forward to funding more research and continuing to deliver on the vision of profitable and sustainable western Canadian grain farmers.



Dr. Keith Degenhardt PhD  
Board Chair, WGRF



Garth Patterson M.Sc., PAg  
Executive Director, WGRF

## Vision & Mission

**Vision:** Profitable and sustainable western Canadian grain farmers.

**Mission:** Producers directing investments into crop research to benefit western Canadian grain farmers.

## WGRF MEMBER ORGANIZATIONS

Agricultural Producers Association of Saskatchewan

Alberta Barley

Alberta Federation of Agriculture

Alberta Wheat Commission

BC Grain Producers Association

Canadian Canola Growers Association

Canadian Seed Growers' Association

Keystone Agricultural Producers

Manitoba Crop Alliance

National Farmers Union

Prairie Oat Growers Association

Saskatchewan Barley Development Commission

Saskatchewan Flax Development Commission

Saskatchewan Wheat Development Commission

Western Barley Growers Association

Western Canadian Wheat Growers Association

Western Pulse Growers

Western Winter Cereal Producers



# DIRECTOR DIVERSITY DRIVES RESEARCH SUCCESS



## WGRF Board model empowers farmers to make decisions for farmers

**When the Western Grains Research Foundation (WGRF) was created in 1981, the mandate was clear – farmer-funded, farmer-directed crop research to benefit western Canadian grain farmers.**

Since then, more than 130 farmers from across all four western provinces have served on the Board of Directors, investing more than \$210 million to support a diverse range of crop research projects.



“As producers, our involvement in research direction for crops is so important,” says Jill Verwey, WGRF Director since 2019 and farmer in Portage la Prairie, MB. Her family seeds more than 8,000 acres of cereal, oilseed and pulse crops each

year in addition to managing a commercial cow-calf and dairy operation. “The farmers who sit around the WGRF Board table all have input and play a vital role in discussions about the future of crop research. These decisions affect all of us, every grain farmer in Western Canada.”

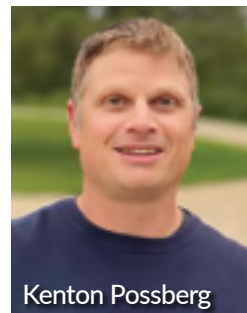
### Working together for the common good

Today, 18 farmers who grow a mix of 31 crops across various soil zones throughout Western Canada make up the current Board of Directors. The diversity of their farming experiences, regional locations, soil textures

and crops means the WGRF Board is a qualified group to direct investments in the future of western Canadian crops. Their decisions ensure research projects that show the most potential to benefit fellow producers get funded, and ultimately fulfill the organization’s vision of enabling profitable and sustainable western Canadian grain farmers.

“**The farmers who sit around the WGRF Board table all have input and play a vital role in discussions about the future of crop research. These decisions affect all of us, every grain farmer in Western Canada.**”

~Jill Verwey, WGRF Director



Kenton Possberg

Kenton Possberg, a WGRF Board member since 2018 says he joined to see first-hand what the organization was all about and how it functioned.

“My first year I was on the Wheat Committee and the last two years I have been on the Research Committee, which I have really enjoyed,” says Possberg who farms with his wife and sons northeast of Humboldt, SK.

“It takes a fair bit of time to go through hundreds of research proposals but it’s interesting to see the inner workings of each proposal, especially during Research Committee meetings where you can hear what other committee members have to say.”

Possberg, who grows canola, wheat, malt barley and oats, adds that he’s proud of the renewed focus the organization has taken in agronomy research.

“WGRF is a powerful tool and a non-partisan way to get research funding out and fill in any research gaps,” he says. The organization’s self-sustaining Research Fund is also unique, leveraging investments and earnings with periodic railway Maximum Revenue Entitlement payments. As Possberg explains, this funding model enables WGRF to make substantial research funding commitments on multi-year projects, securing the long-term stability of crop research in Western Canada.

## Investing in the future

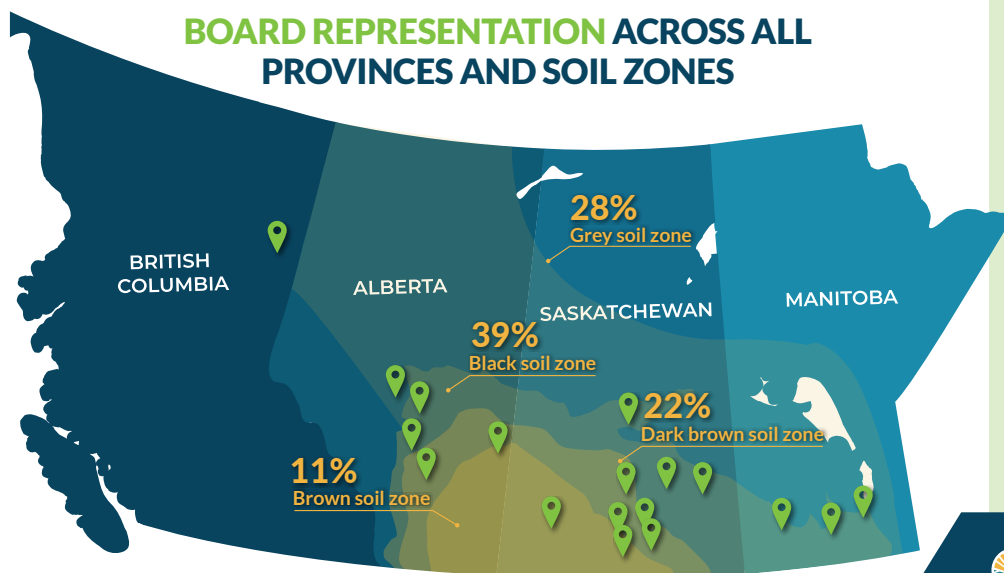


Malcolm Odermatt

“WGRF has such a diverse Board – from members spanning across the Prairie provinces, to the variety of crops grown – we are one of the most unique agricultural organizations,” says Malcolm Odermatt, WGRF Director and Chair of the Research Committee. “The diversity of the Board is also its strength, as members draw on their

knowledge and experiences to direct the future of crop research.” Odermatt first joined the WGRF Board in 2015 when he was in his early 20s, looking to expand his horizons by networking and learning from other farmers. He farms cereals, pulses and grasses for seed production in Fort St. John, BC and says he continues to be amazed by the organization’s contributions to our industry, driving improvements, innovation, efficiencies and sustainability.

## BOARD REPRESENTATION ACROSS ALL PROVINCES AND SOIL ZONES



# 2021 BOARD OF DIRECTORS

**DR. KEITH DEGENHARDT**, Chair  
Hugenden, AB

**STEWART WELLS**, Vice-Chair  
Swift Current, SK

**BILL GEHL**  
Regina, SK

**BILL PRYBYLSKI**  
Willowbrook, SK

**BRUCE DALGARNO**  
Newdale, MB

**DICK WYMENGA**  
Leslieville, AB

**DOUG MARTIN**  
East Selkirk, MB

**GREG SUNDQUIST**  
Watrous, SK

**JASON SKOTHEIM**  
Spruce Home, SK

**JEFF NIELSEN**  
Olds, AB

**JILL VERWEY**  
Portage la Prairie, MB

**JOE RENNICK**  
Milestone, SK

**KENTON POSSBERG**  
Humboldt, SK

**MALCOLM ODERMATT**  
Fort St. John, BC

**MARK AKINS**  
Hearne, SK

**MIKE AMMETER**  
Sylvan Lake, AB

**TERRY YOUNG**  
Lacombe, AB

**WADE HAINSTOCK**  
Moose Jaw, SK

# ACCELERATING CAPACITY

## Funding assets to expand crop research

Putting the people, tools and infrastructure in place to accelerate and expand crop research. That's the purpose behind WGRF's \$32-million Capacity Initiative.

Phase 1 of the initiative was focused on expanding human resources. As such, WGRF supported the Universities of Alberta, Manitoba and Saskatchewan in their vision to establish Research Chairs.

In 2019, WGRF initiated Phase 2 with a competitive, proposal-based process to expand the tools (infrastructure and tangible assets) necessary to accelerate crop research for the benefit of field crop farmers in Western Canada.

"Funding for capital purchases can be difficult for research organizations to access," says Garth Patterson, WGRF Executive Director.

"That's been the goal of our Capacity Initiative – identifying the gap, either in human resources or infrastructure resources, and then funding a solution."

The Board has approved 24 applications for equipment, technology and building projects, totalling more

than \$24 million. To date, WGRF has announced funding of over \$3.2 million to nine institutions across Western Canada with more to come once final agreements are signed.

**Learn about the impact this investment is having by reading the stories on the pages ahead. From seeding through to harvest, the Capacity Initiative is helping research programs deliver a positive on-farm impact for producers.**



## FUNDING RECIPIENTS TO DATE INCLUDE:

Chinook Applied Research Association (\$266,942)  
Conservation Learning Centre (\$266,931)  
East Central Research Foundation (\$60,440)  
Farming Smarter (\$253,000)  
Gateway Research Organization (\$293,492)

Indian Head Research Foundation (\$727,470)  
Mackenzie Applied Research Association (\$300,000)  
University of Alberta Breton Plots (\$284,000)  
University of Alberta Wheat Breeding Program (\$288,550)  
University of Saskatchewan Insect Research Facility (\$500,000)



# INCREASED EFFICIENCY AND POTENTIAL

## New plot combine harvests better data

Harvest got a whole lot easier at the Conservation Learning Centre (CLC) in the fall of 2020 when Brooke Howat and her team put their new Wintersteiger plot combine to work for the first time. Soybeans, wheat, barley, canola, sunflowers, quinoa, dry beans and lentils all came off without stress or delay.

The producer-driven, non-profit research program successfully applied for the purchase of the new equipment through WGRF's Capacity Initiative. Located south of Prince Albert, Saskatchewan, CLC is an integral part of the Agri-ARM network of research and demonstration sites across the province.

According to Howat, CLC Acting Manager, the new combine replaced a 1985 model that was prone to breakdowns. "It would require repair several times during harvest, making it very difficult to get everything off. And no matter what we did with the settings, it wouldn't give very clean samples," she says. "So then we'd have to go through, clean everything, and then re-weigh everything. And it just made a ton of work for us."

The \$266,931 investment is already paying off. Harvest is much smoother with reliable equipment and added

features make the job easier as well. "The new combine has a perfect cleaning system and will do precise weight and moisture measurements for us. So that really cuts down on the amount of work we need to do."

### Improved data quality and results

The combine has clearly reduced workload for Howat and her team, but it has also contributed to better quality data. "There were more steps with our old combine. First combining and collecting samples and then manually cleaning, weighing and taking moisture of the samples. With this new combine there's not as many steps, so there's less chance of error. I think that's helped to improve our results."

**“It allows us to increase the number, diversity and scale of research projects on site, providing producers with more relevant and local information.”**

In addition to day-to-day benefits, Howat looks at the bigger picture of what the new equipment means for the future of CLC. "It allows us to increase the number, diversity and scale of research projects on site, providing producers with more relevant and local information," she says. "We're thankful to have secured such a key piece of research equipment with the help of WGRF."



# FARMING SMARTER AND FASTER

Capital investment accelerates research capacity





It's tough to conduct research when your combine has a tendency to catch fire. That was once a reality at Farming Smarter, a not-for-profit research organization based in Lethbridge, Alberta. Fast forward 14 years and the recognized leader in regionally focused agronomy research is thriving with a reliable fleet of field equipment.

"The Wintersteiger Flex plot seeder and Quantum plot combine purchased with support from WGRF are likely the two most important pieces of equipment that enable our program to flourish," says Ken Coles, Executive Director, Farming Smarter. He's referring to WGRF's investment of \$253,000 through its Capacity Initiative.

Adding these key capital items to the inventory of research tools at Farming Smarter is critical to expanding their crop production research program in terms of size, scope and quality. The growth is vital to the program that reaches thousands of growers and industry stakeholders every year.

**"The Wintersteiger Flex plot seeder and Quantum plot combine purchased with support from WGRF are likely the two most important pieces of equipment that enable our program to flourish."**

"Very few grants are available to support capital items in agriculture research. So we are very appreciative of WGRF for recognizing this gap," he says. "Having the proper equipment to do the job is so important. We are able to do so much more work, so much more efficiently and with higher-quality results. It will help us grow to the next level."

## **Better data and client relations**

Farming Smarter's new, one-of-a-kind plot seeder was first put to use to plant over 40 research trials in spring 2021. "Springtime is such a crunch to get trials in. Not only are we dealing with a short seeding window, but half of the time we're getting late funding approvals for trials,

we're getting late contracts and we're scrambling," says Coles. "By having an extra seeder, it literally more than doubles our capacity."

Thanks to the equipment boost, the Farming Smarter team was able to get everything done in a timely manner. "When that happens, you get better data, you get better client relations and you get better grant success rates because you're achieving what you said you were going to do," he says.

## **Increased speed and quality**

The Quantum plot combine is also a top-of-the-line machine that increases speed and quality of yield data.

"You can only do so much with one combine and when you get a second one, you're able to almost double the amount of trials that you can do," says Coles.

He adds that the new combine is powerful enough to harvest difficult crops such as hemp and is versatile enough to be used for both small plot harvest and their Field-Tested program. "It's not only improving our capacity on small plots, but it will improve the quality and efficiency of field-scale research," says Coles.

## **Propelling towards success**

Farming Smarter's mission is to provide cost-effective research, demonstrations and extension for producers to facilitate greater returns on their investment. Both pieces of equipment provide the means to increase capacity, address research gaps and alleviate pressure at seeding and harvest time.

"As you grow an organization, you're at the crest of the wave, and when you get a couple infusions of good equipment or good people, whichever you're needing the most, then that's what really propels you off that wave and onto the next one," says Coles.

With the new additions to the Farming Smarter fleet, Coles and his team are ready to catch the next wave.



# BUILDING BLOCKS FOR EXPANSION

## Equipment upgrade boosts IHARF research capacity

The Indian Head Agricultural Research Foundation (IHARF) is well poised for expansion with the recent addition of equipment and infrastructure that's allowing for increased research and quicker, more meaningful results for farmers.

The non-profit organization received \$727,470 in funding through WGRF's Capacity Initiative to purchase processing and analytical equipment, a tractor, plot combine, drone, fertilizer applicator, multiple weather stations, a drying shed and more.

"We appreciate the opportunity to be able to secure items that would have taken decades for us to be able to afford," says Danny Petty, IHARF Executive Manager. "Taking that financial burden off of our infrastructure needs allowed us to re-direct our attention towards our research program and even hire a full-time research technician, which we've never had before."

Located in Indian Head, Saskatchewan, IHARF grows more than 1,200 acres annually, conducts up to 60 small-plot research and demonstration projects, leads field-scale studies with growers and hosts extension

events. Throughout its 25-year history, the organization has had to share field equipment and other resources with Agriculture and Agri-Food Canada's Indian Head Research Farm. The applied agronomic research programs operated by both parties were at maximum capacity – until the arrival of IHARF's latest acquisitions.

### More efficient data collection and analysis

Thanks to new analytical equipment, Petty no longer has to send samples away and pay for third-party testing. Proper processing equipment is really speeding things up too. "We don't have to use the little hand sieves as much as before for processing harvest samples."

IHARF's new weather stations also provide more accurate results. "We've always relied on the Environment Canada station here at the Research Farm. But now, we can set our own stations right beside the trial sites to get more accurate weather data throughout the growing season," he says.

Petty sums the advantages up by saying "We can get more data from the research we're doing now and it's more efficient. That means we can communicate results to growers more quickly as well." The additional equipment and staff will also allow IHARF to take on work in a wider array of crops.

"We are very grateful to WGRF for making this investment in our program," says Petty. "By providing the building blocks to allow IHARF to expand its operations, not only will we be able to increase our small-plot research program, but we'll be able to expand our work on-farm with growers."



# RESEARCH WITH CONFIDENCE

## Infrastructure investment delivers quality results

For more than 40 years, the Chinook Applied Research Association (CARA) has provided an important link in the transfer of knowledge between researchers and producers in east central Alberta. CARA is positioned to continue serving that valuable role well into the future with a recent infrastructure investment.

The producer-run group located at Oyen, Alberta was recently awarded \$266,942 from WGRF's Capacity Initiative to acquire a full line of small plot equipment.

"With this funding we are able to purchase assets – a plot combine, tractor, ¾-ton truck, GPS unit, cargo trailer and a mower tractor – that will ensure the quality of applied research conducted at CARA is not compromised by mechanical limitations during seeding, harvest or site maintenance," says Dianne Westerlund, CARA Manager.

**“Having this new equipment gives us more confidence in the information that we’re able to share with our producers and, in turn, gives them more confidence as they make decisions utilizing that information.”**

CARA's applied research includes more than 3,500 plots of variety trials (both annual and perennial crops), agronomic and rotation studies plus evaluation of crop and soil amendments. Testing under local conditions provides producers with truly relevant results.

"Having this new equipment gives us more confidence in the information that we're able to share with our producers and, in turn, gives them more confidence as they make decisions utilizing that information," says Westerlund, noting that may include variety selection, an agronomic practice, fertilizer application, crop rotation and more.

### Timely data collection

According to Westerlund, much of what they've acquired with the help of WGRF cost-share funding replaced equipment that was no longer dependable and, in some cases, so old that parts were impossible to source.

"You need equipment that's operating well to give you quality results," says Westerlund, adding that timing is key with replicated small plot trials. "Once we have the data, statistical analysis determines whether the actual results are reliable and repeatable, or if they are just strictly chance. Using good management practices throughout the growing season and harvesting on a timely basis, helps ensure that the quality of the information we're collecting, and then passing on to producers, is very sound."

With the new equipment expected to take to the field for the 2022 season, CARA is set to continue arming producers with vital information to help them farm for another 40 years.



**“We’ll be able to identify insect-related problems and start working on solutions before pests become established or a major problem in Canadian agriculture.”**

# **ELEVATING INSECT RESEARCH**

**New research facility gets proactive on pests**

**A world of possibilities awaits the University of Saskatchewan (U of S)’s new Insect Research Facility (USIRF) that’s set to open later this year. The facility will be the only one of its kind on the Prairies, led by Dr. Sean Prager – the first entomologist at U of S’s College of Agriculture and Bioresources.**



“There’s never been a designated space for entomological research at the College,” says Prager, an Assistant Professor of Plant Sciences and Associate Member of the Department of Biology. “So now we’ll be able to identify insect-related problems and start working on solutions before pests become established or a major problem in Canadian agriculture.”

Construction of USIRF, located inside the Agriculture Building on the Saskatoon Campus, is expected to begin this summer with plans to be fully operational by fall 2022. It’s designed to meet Canadian Food Inspection Agency (CFIA) standards, allowing for research to be done on any plant, insect or pathogen that is regulated by CFIA (at level PPC-2). The facility will address the increased need for entomological research, training and instruction at U of S.

## Keeping pace with pests

One of the big opportunities with USIRF will be to get out ahead of pest problems, working on solutions before specific insects become a major problem at the farm and field level. This type of pest research wouldn’t be possible without a new facility, which is expected to lead to new sustainable pest management strategies for western Canadian field crops including canola, wheat, barley, oats and pulses. The facility will also provide hands-on training to help develop advanced entomological skills that are increasingly important to crop production.

Prager and his team will also get a head start on providing support for breeding new varieties and cultivars through USIRF. “We can be more proactive by working closer with plant breeders at the Crop Development Centre, U of S and Agriculture and Agri-Food Canada to identify resistance traits to pests that are yet to become a problem,” he says.

## Any insect you can imagine

Prager is excited about the endless potential of research at the facility that will contain walk-in growth chambers designed specifically for housing different insects and pathogens, including special HVAC systems to manage air flow. “We can keep any insect at the

facility and conduct any research you can imagine that requires organisms that we weren’t able to study before,” he says. The new research site is expected to shorten the time required for research results and advances in pest management.

Prager points to an example that illustrates the type of insect pests they’ll be able to monitor, research and study more closely. There are several areas in the United States where pulses are plagued by insect-transmitted viruses. The viruses are not yet a problem in Canada. “This facility would let us receive organisms from Washington, for example, and test insecticides that could kill the insects before they transmit viruses and work on new detection methods,” says Prager.

They’ll also be studying beneficial insects – both those currently used in Canada and those collected from other places. One of those beneficials is a predator of soybean aphids. “There are parasitoids that are natural enemies of soybean aphids that are not native to Canada so we normally would not be able to study them here,” says Prager. “But in our new facility we could have samples of the beneficial sent to us, to evaluate if they would work here to control aphids at some future point.”

## WGRF commits to facility

Development of USIRF is supported in large part by WGRF, which is funding \$500,000 through its Capacity Initiative towards the construction of the estimated \$1.1 million facility. Additional funding has been provided from the Canadian Foundation for Innovation, Saskatchewan Canola Development Commission, Saskatchewan Pulse Growers, Saskatchewan Wheat Development Commission and U of S.

“We’re really excited about what we will be able to do in this space,” says Prager. “We have students and post docs that can’t wait to get to work. And we know there are a lot of benefits for farmers that we’ll be able to maximize now.”



# CROSS-CUTTING CROP RESEARCH PRIORITIES

## WGRF establishes future field crop research needs

### What future research is vital to support field crop production in Western Canada?

The Western Grains Research Foundation (WGRF) identified issues and questions with the help of hundreds of farmers, agronomists and scientists. Armed with this knowledge, WGRF recently established priorities to guide the organization when funding cross-cutting crop research.

“This is the culmination of an 11-month process that kicked off in January 2021 as part of WGRF’s 40th anniversary,” says Garth Patterson, WGRF Executive Director. He explains that cross-cutting issues are common to at least two or more of the fifteen crops eligible for WGRF funding (barley, canaryseed, canola, chickpea, corn, fababean, flax, lentil, mustard, oats, pea, soybean, sunflower, wheat and winter cereals).

WGRF’s ‘Cross-Cutting Crop Research Priorities’ encompass issues that affect farmers no matter what

crop they’re growing. In total, six themes, 17 associated issues and 66 research questions are outlined in the guidance document that will be essential to scientists and institutions seeking funding from WGRF. (See sidebar for themes and issues.)

“We will continue to fund crop-specific research, however, as crop commissions and associations have crop-specific research interests and share these with WGRF, crop-specific research issues were out of scope in this process,” says Patterson.

### Collaborative process

More than 300 farmers, agronomists, scientists and WGRF Members participated in the process that solidified the type of cross-cutting crop research WGRF will fund in the future.

As a first step, WGRF contracted Drs. George Clayton and Stephen Morgan Jones of Amaethon to gather views on the future of western Canadian field crop

**“WGRF’s ‘Cross-Cutting Crop Research Priorities’ encompass issues that affect farmers no matter what crop they’re growing. In total, six themes, 17 associated issues and 66 research questions are outlined in the guidance document that will be essential to scientists and institutions seeking funding from WGRF.”**

production in the short (five year) and longer term (10 to 20 years). This resulted in the Amaethon Report “Survey on Future Changes in Crop Production on Prairie Farms and Implications for Research.”

“This type of survey is important for growers, because they have the opportunity to provide input into where they see the future, and the need for solutions and research,” says Dr. Clayton.

“Farmers will be the recipients of the research that comes out of this initiative, making it a great two-way communications process to prioritize and develop research priorities.”

“There was general agreement that farms would likely continue to get larger and that smaller farms would become more specialized in their cropping practices,” says Dr. Morgan Jones. “Cereals, canola and pulses would continue to be the major acreage crops grown but there was considerable divergence of opinion on which crops would have expansion opportunities and those that would decline in popularity.”

## Virtual workshops and member consultation

In summer 2021, WGRF embarked on step two of the process. This involved hosting three virtual workshops with the aim of identifying the implications for research associated with the issues identified in the Amaethon Report. Workshop topics included: crop and soil management (weeds, diseases, insects, plant nutrition); precision agriculture (variable rate, soil management zones, data); and sustainability (cropping systems, diversified crops, climate change).

In fall 2021, WGRF moved to the third phase of the project and consulted with its Members to generate further discussion.

“Based on the Amaethon Report and the Summer Workshop Report, we drafted a summary of cross-cutting crop research themes that was categorized into six themes containing 24 issues, over 100 research questions and numerous knowledge translation and transfer messages,” says Patterson. “Views provided by Members confirmed the importance of the issues and research questions to western Canadian grain farmers.”

## Establishing research priorities

“This is the first time we’ve provided this level of detail on our cross-cutting crop research priorities. We can confidently move forward funding research that has been deemed to be high priority by those who will benefit from it,” says Patterson.

# RESEARCH THEMES AND PRIORITY ISSUES

## Theme 1: Weed management

- Assessing and predicting the continually evolving situation
- Alternative weed management practices that farmers might employ in the future
- Loss of glyphosate as an effective herbicide

## Theme 2: Disease management

- Assessing and predicting the continually evolving situation
- Understanding crop diseases
- Control strategies

## Theme 3: Insect pest management

- Assessing and predicting the continually evolving situation
- Understanding crop insect pests and beneficial insects
- Control strategies

## Theme 4: Plant nutrition

- Assessing and monitoring soil health and plant nutrition issues
- Increasing nutrient use efficiencies
- Understanding soil/root interactions, soil biology, soil quality and soil resilience

## Theme 5: Response to weather variability and climate change

- Understanding weather variability and climate change
- Adaptation to weather variability and climate change
- Develop methods for reducing greenhouse gas (GHG) emissions and capturing carbon on farms for farmer benefit

## Theme 6: Sustainable resource management

- Soil quality/soil health
- Cropping systems





# BALANCING ENVIRONMENT AND ECONOMICS

Research Chair focuses on 4R Nutrient Stewardship

**Dr. Mario Tenuta sees all the opportunities that come with reducing greenhouse gas emissions (GHG) associated with crop production in Western Canada.**



Dr. Mario Tenuta

Lowering the environmental footprint is obvious, but he's also looking at ways to address the growing green expectations in the global grain marketplace.

Tenuta – a soil science professor in the Faculty of Agricultural and Food Sciences

at the University of Manitoba (U of M) – is part way

into a five-year position as the Natural Sciences and Engineering Research Council of Canada (NSERC) Industrial Research Chair in 4R Nutrient Stewardship. The title is a mouthful, but the goal of his program is simple – how 4R farming practices can reduce GHG emissions from soil. The \$2.9 million program is focused on field-level, on-farm trials to determine the best combination of 4R elements – right fertilizer, right rate, right time, right place – to recommend to farmers to balance crop production and productivity while reducing GHG emissions.

“Fertilizer nitrogen represents the highest operating cost in field crop production in Canada,” says Tenuta. “Our research and outreach will provide practical and

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feasible ways to improve crop productivity and reduce direct and indirect emissions of nitrous oxide and nitrate leaching. This will help Canadian farmers continue to be leaders in the export of sustainably produced, high-quality food to much of the world.”

## Focusing on nitrous oxide

Tenuta’s work is zeroing in on nitrous oxide. It’s a greenhouse gas that’s released from soil into the atmosphere whenever nitrogen cycles through soil. “We’re looking at 4R practices that will limit the release of nitrous oxide directly from crop soil, as well as the indirect release that comes from ammonia and nitrate,” he says.

Existing research already provides some options for reducing nitrous oxide emissions, from the use of nitrification inhibitors added to fertilizer to slow down the transformation of ammonium to nitrate, and practices to protect nitrogen from losses such as subsurface banding.

## Delivering realistic, farm-level results

When it comes to developing on-farm recommendations, Tenuta knows it’s critical to balance agronomic expectations with the bottom line impact to the farmer. “We always consider practices for a sustainable production system that a farmer can actually use in their operation. I call it practical, field-based, grower-centric research,” he says.

Tenuta and his team have purposely chosen to conduct experiments on farm fields with cooperating farmers. “We always find it better to work in farmers’ fields to provide the most realistic soil conditions to study nitrogen responses and emissions as we vary the 4R elements,” says Tenuta.

They’ll be studying effectiveness of nitrification inhibitors with certain types of fertilizers, especially anhydrous ammonia – the most common fertilizer in Western Canada, and particularly Manitoba where it is applied in the fall. “We are doing field trials looking at how to protect nitrogen in the fall so it’s not emitted as nitrous oxide in the spring and that farmers don’t need to compensate rates for over-winter losses.”

Another aspect of Tenuta’s work is a closer look at monitoring leaching and ammonia losses, which are not well understood for Western Canada. “We’ll see how the 4R practices and combination of practices can reduce those losses, and how that impacts reducing nitrous oxide emissions,” he says.

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## Strengthening Canadian agriculture

The Industrial Research Chair position represents a unique opportunity for Tenuta and a high priority for U of M to provide resources and capacity for research, graduate teaching, extension and outreach. They’ve purchased world-class instrumentation to use with on-farm trials, and their work will drive more sustainable solutions for crop production. “The work we are doing will help preserve our major export markets because we are reducing emissions and the overall footprint of western Canadian crop production,” says Tenuta. “We’ll be strengthening Canada’s role as an active participant in creating solutions for a global issue.”

## Partnership powers new research

Tenuta’s role is supported, in part, by the Western Grains Research Foundation (WGRF). “We are excited about the potential impact this research can have for farmers,” says WGRF Executive Director Garth Patterson. “We have made it a priority to increase the agronomic research capacity in Western Canada through a number of strategic investments, including this role for Dr. Tenuta.” The five-year position was awarded to Tenuta in partnership with NSERC, WGRF, Fertilizer Canada and U of M.





# DRILLING DOWN ON OPTIMAL SEEDING DATE

Interaction of management and environment on crop yield

## **Optimal seeding dates can be fine-tuned based on specific growing conditions to deliver more yield.**

That's the preliminary finding of a two-year research study by Christiane Catellier, Research Associate with Indian Head Agricultural Research Foundation. She's evaluating the interaction of management and environment on crop production in Saskatchewan using ten years of producer-reported data.

The study, funded by the Western Grains Research Foundation, will help determine how the effects of seeding date and crop rotation on crop yield vary with environmental conditions in Saskatchewan.

"Crop production is becoming more and more precise and producers want to be able to tailor their management decisions to the specific conditions of their operation," says Catellier. She's hopeful that through her study producers will benefit from better understanding the effect that seeding date and crop rotation has on their crop productivity.

Of course producers can currently access general seeding date and crop rotation recommendations, but Catellier is seeking to get much more specific.

During the first phase of the study, she set out to answer key seeding date questions. "Is there a different optimal seeding date depending on location, and are producers losing minimal yield by delaying seeding?" she asks. "We'd also like to explore which environmental variables seeding date interacts with to affect yield."

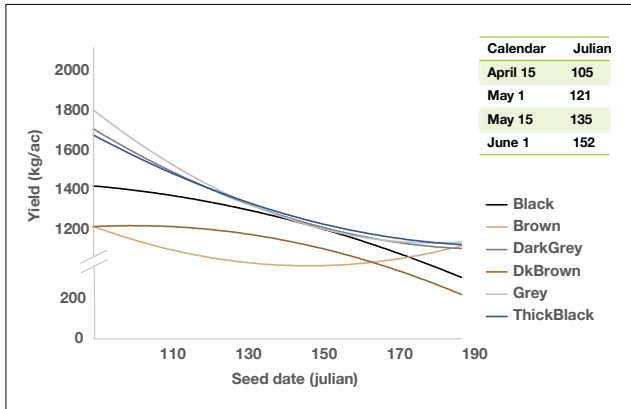
## **Study methodology**

To find the answers, Catellier is drawing upon a massive set of producer-reported data obtained from the Saskatchewan Crop Insurance Corporation (SCIC) as well as environmental (soil and weather) stats. The data has been collected over many years – 2009 to 2018 – and encompasses all major crops and growing areas in Saskatchewan.

"We have a huge untapped resource," Catellier says of the information. "Producers can find online summaries



## Barley Results by Soil Zone



Barley yields vary by seeding date and soil zone.

of crop acres and yields by grain risk zone or variety; however, there is a lot more potential in this data set. A deeper analysis would benefit producers.”

Variables in the data set include the year, land location, crop and variety, seeding date, fertility rates and yield. SCIC also provided environmental data (daily precipitation and temperature) for 131 weather stations throughout Saskatchewan. As the two were not linked, Catellier did the work of assigning land locations to the nearest weather station as well as soil zone, crop district and grain risk zone. She is now embarking on a lot of statistical analysis and data manipulation.

## Preliminary findings

So what has the analysis revealed so far?

“Well, we are seeing some differentiation in responses to seeding dates based on geographical location – soil zones specifically. We are also seeing some differentiation based on specific environmental conditions such as precipitation and heat units,” reports Catellier.

Analysis of all major crops is still in progress, but she shares some preliminary findings related to barley. “The yield response to seeding date varied significantly by soil zone, average seasonal rainfall and average seasonal Growing Degree Days (GDD),” she says.

For example, in the thick black, dark grey and grey soil zones, there is reduced yield with any delay in seeding, while in the black and dark brown soil zones there is

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less yield loss with delayed seeding at early seeding dates, but the penalty increases with later seeding dates. (See graph)

Consistent with the response by soil zone, there is a yield decrease with a delay in seeding in higher seasonal rainfall areas. In lower rainfall areas, Catellier notes less yield loss with delayed seeding at early seeding dates and an increasingly greater penalty with later seeding dates.

## Crop rotation analysis

Once the seeding rate work is complete, Catellier will use the same data set to tackle a similar analysis of the effect of crop rotation on yield of various crops and how it varies by environment.

“For example, right now, in some locations, a specific crop rotation might not be as detrimental as in other locations,” she says. “Certain conditions are not conducive to disease cycles, so in those locations, your crop production might be less affected by a specific crop rotation.”

Final results will be available in early 2022.

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# INSECT SCOUTING SIDEKICK

## New field guide proves a valuable tool

**It's important to identify and manage both insect pests and predators during the growing season.**

This year, a new scouting partner helped western Canadian farmers and agronomists quickly recognize both types of insects and distinguish between them. They had the latest Field Heroes resource by their side, either in hand or on-screen.

The *Pests & Predators Field Guide* is a 100-page publication full of high-quality images and information. The 'Insect Quick Guide' section features photos of pests most commonly found in cereals, pulses and oilseeds alongside images of the predators and parasitoids that can help to control them. Practical

identification tips as well as lifecycle and diet information is then organized by species

to provide users with a thorough understanding. Management options for pests and conservation options for beneficial insects are also included.

### Quickly ID pests and predators

"The design of the guide is unique because it enables users to learn to identify not only the main crop-feeding insects, but also those that have beneficial roles," says Dr. John Gavloski, Entomologist with Manitoba Agriculture and Resource Development. "Beneficial insects are categorized by order to enable similar looking insects to be easily compared."

Gavloski was one of 20 field crop extension and research entomologists who combined their technical knowledge and expertise to create this resource. These Field Heroes ambassadors are passionate about sharing the value of beneficial insects so growers can make more informed pest management decisions. Beneficial insects can reduce the need for spraying, which lowers cost of production and protects the environment.

"To farm most economically and efficiently, the way we view and react to insects is very important," says



**In any given field there are many insects contributing to farm profits through free services of predation, parasitism, decomposition, pollination and consuming weed seeds. Getting to know these beneficial insects will enable wise management decisions and increasing the number you can identify is the first step.**



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## Mission accomplished

Launched ahead of the 2021 growing season, the field guide was primarily promoted as an interactive digital resource accessible on a phone or tablet, even in areas with low mobile signal.

Since traditional grower meetings and other in-person events were limited due to the COVID-19 pandemic, quantities of printed copies ordered were expected to be low. But soon after it was launched, the resource received rave reviews on social media – deemed as

a farmer ‘must have’ for the season – and popularity soared. There were nearly 1,600 online views and more than 1,000 hard copies ordered within the first six months.

## Field Heroes resources

The *Pests & Predators Field Guide* complements other resources at [FieldHeroes.ca](https://FieldHeroes.ca), including scouting factsheets, videos and a podcast series. The ongoing WGRF initiative is focused on boosting the awareness of beneficial insects and the role they play in pest management. The campaign continues to provide a platform for entomologists to share their knowledge with farmers and crop advisors and aims to promote beneficial insects as a factor in production decisions.





THINK BENEFICIALS  
BEFORE YOU SPRAY

# PESTS & PREDATORS

## FIELD GUIDE

GET YOUR  
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[FIELDHEROES.CA](http://FIELDHEROES.CA)



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