

# AGKNOWLEDGE

## Empowering partnerships: Wild rice research puts Indigenous communities at the forefront



UNIVERSITY OF SASKATCHEWAN

College of Agriculture  
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◀ Cover photo:  
Aerial view of wild rice growing at Meeyomoot Lake, Sask. See page 26 for story.  
*Photography by Dr. Tim Sharbel (PhD)*

# Dean's message

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As I sat down to write this message, I found myself once again reflecting on the college's strategic plan, appropriately themed "Adapting to Change." Extending to 2025, the theme selected back in 2018 could not have been more prescient.

So far, we have seen a global pandemic, widespread drought, major changes in the college leadership team, many faculty retirements, new faculty hires, new degree and certificate programs, and a revitalization and renaming of our Indigenous Land Management Institute.

This issue of Agknowledge highlights many of the exciting changes, including our new associate dean academic, our Western Grains Research Foundation Research Chair, and the inspiring plans for the kihci-okâwîmâw askiy Knowledge Centre. Our faculty and staff are finding new ways to support food security, from work with Indigenous communities on wild rice cultivation to innovations in value-added processing in our Bioprocessing Pilot Plant.

Amongst all these changes, what hasn't changed is our commitment to responsibly caring for the environment while finding solutions to meet the demands of a hungry and growing world. You will read here about Dr. Pierre Hucl (PhD), who has announced his pending retirement, but not before his remarkable contributions to crop breeding led to his investiture with the Saskatchewan Order of Merit.



Dr. Angela Bedard-Haughn (PhD)

Photography by David Stobbe

Our impressive alumni and our passionate graduate students are having impacts in communities, government, and across the entire value chain, from soil security to animal health and beyond.

In April 2023, USask launched the Be What the World Needs Campaign, the largest fundraising initiative in the history of the University of Saskatchewan. In concert, our donors and partners continue to step up and support our mission, through generous gifts of land, equipment, and financial resources that will allow us to have even greater impact, now and into the future. These investments ensure that we can deliver on our aspirations to be the college the world needs and continue to grow a strong, sustainable future for Saskatchewan and beyond.

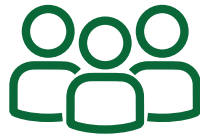
As dean of the College of Agriculture and Bioresources, I feel so fortunate to spend my days working with enthusiastic students, passionate faculty and staff, and the community that shares our commitments. Thank you for being part of that community. This issue provides just a glimpse into what we do, and I hope the stories are as inspiring and exciting for you as they are for us! 🍀

# 2022-23 Year in Review

Rooted in history since 1912, the College of Agriculture and Bioresources is growing the future. ↗



**1,728**  
Students



**307**  
Staff

**\$34.4**  
million



New awarded research funding

**1,379**  
Undergrad

**349**  
Graduate

**77**  
Faculty

**\$1.7**  
million



Scholarships, bursaries, awards

## Undergraduate students by program

Bachelor of Science, Agriculture **671**

Bachelor of Science, Agribusiness **224**

Bachelor of Science, Animal Bioscience **281**

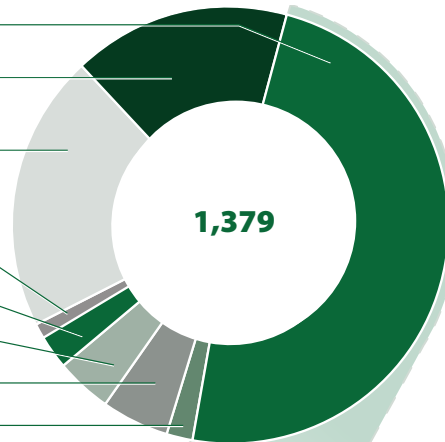
Bachelor of Science, Food and Nutrition **16**

Bachelor of Science, Renewable Resource Management **36**

Diploma in Agribusiness **56**

Diploma in Agronomy **69**

Kanawayihetaytan Askiy Program **26**

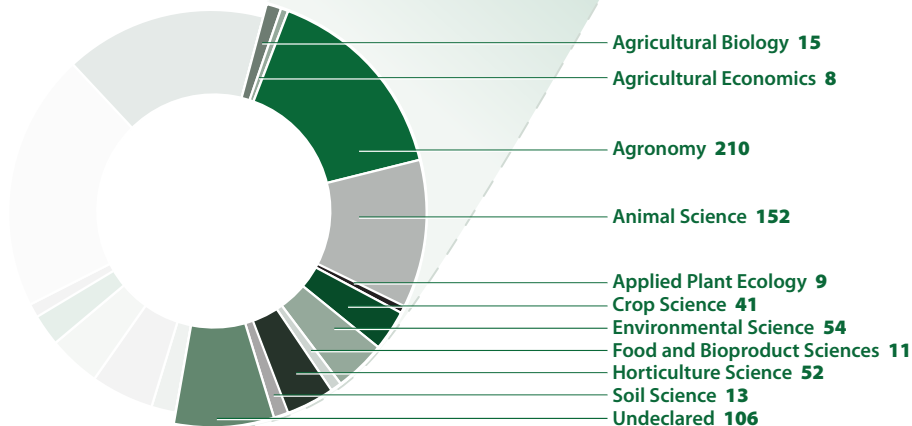


Prairie Horticulture Certificate



**123**  
students

## Bachelor of Science, Agriculture students by major



# Shedding light on soil properties

University of Saskatchewan graduate student research looks at advanced technologies to analyze and map soil properties.



 **JANE CAULFIELD**

Grace Gowera  
Photos submitted

There's a lot of information needed when determining what crops go in which field. From working with forecasted weather patterns to detailed crop rotations, producers need to collect a lot of data to make the best decisions for success. Some of the most vital information needed to make beneficial agricultural decisions comes from understanding what is in the soil.

However, traditional methods of understanding soil properties, such as field soil sampling and laboratory analysis, are known to be destructive, time-consuming,

and expensive. It's a perplexing problem PhD student Grace Gowera of the College of Agriculture and Bioresources has decided to tackle.

"My research looks at rapid ways of measuring soil properties, particularly soil organic carbon and soil salinity," said Gowera. "Soil spectroscopy involves directing light to a soil sample and measuring how the light interacts with it. On the other hand, remote sensing using satellite images can be used to interpolate soil information. These technologies offer fast, non-destructive, and cost-effective

way of analyzing and mapping soil properties."

Supervised by Dr. Angela Bedard-Haughn (PhD) and Dr. Preston Sorenson (PhD), Grace's focus is exploring how new technologies can enhance the overall process, ultimately improving outcomes for producers around the world.

"The study involves analyzing soil samples with varying compositions and understanding the relationship between soil spectral reflectance and soil properties using machine learning techniques," said Gowera. "By utilizing these advanced

methods, we gain a more accurate understanding of soil conditions and can then make informed decisions on soil management practices. The application of reflectance spectroscopy and remote sensing technologies for precision soil management holds significant promise.”

While Grace gathers data through a physical collection of soil from the field, she also examines data from satellite imagery using Google Earth Engine. She then relies on advancements made in machine learning for analysis to help producers identify and recognize patterns that inform predictions and inform agricultural decisions. From customized application of inputs that reduce costs, to improving yields, this research will provide benefits for the producer as well as the environment by improving operational practices over longer periods of time.

“This research has the potential to facilitate large-scale monitoring and management practices, enabling farmers and land managers to optimize their land use strategies, reduce input costs, enhance crop productivity, and foster sustainable agricultural practices,” she said.

### Putting the results on a global scale

Originally from Zimbabwe, Grace said that her interest in agriculture comes from growing up on her grandparents’ farm.

“I always wondered why they spent so much time in the fields,” she said. “However, over time, I came to understand that the farm served as a vital source of income, food and employment. That sparked my interest in agriculture. As I delved deeper, I began to recognize the challenges they faced, which directly impacted crop productivity, such as water shortage and soil salinity.”

Through her research, she is keen to develop new approaches that can revolutionize agricultural practices around the world and enhance how producers manage their crops in a wide variety of climates and environments.

“Producers with enhanced soil management can make informed decisions on nutrient management, irrigation, and crop selection, leading to improved agricultural productivity,” she said. “Additionally, resource optimization can be achieved by tailoring inputs based on soil



carbon and salinity levels, reducing waste, and improving economic efficiency and sustainability.”

While these advancements mean that producers can access vital information in more cost effective and efficient ways, the research Grace is doing also has the potential to help ensure there is a viable future for agricultural practices on a global scale.

“With the projected population growth and the consequent demand for increased food production, it is imperative to develop effective strategies for agricultural management,” she said. “The promotion of sustainable agriculture practices, such as minimizing soil degradation, conserving water resources, and reducing

agrochemical use, can also be facilitated.”

More sustainable practices mean that we can limit the effects of climate change on agricultural outputs and, potentially, the global food supply.

“This research contributes to climate change mitigation by implementing soil carbon sequestration practices like cover cropping and organic amendments, thereby reducing greenhouse gas emissions and enhancing carbon sinks,” she said. “Furthermore, the early detection and intervention in soil salinity issues allow for timely measures such as improved irrigation techniques and the selection of salt-tolerant crops, mitigating potential productivity losses.” ♥



# New horizons

**New Associate Dean Academic Tom Yates plans to enhance connections with First Nations and promote industry collaboration/professionalism.**

**Dr. Tom Yates (PhD) began his term as associate dean academic in the College of Agriculture and Bioresources on July 1, 2023.**

*Photography by Ian Goodwillie*

## JOANNE PAULSON

Dr. Tom Yates (PhD) likes, quite literally, getting his hands and feet dirty. The new associate dean academic for the College of Agriculture and Bioresources at the University of Saskatchewan (USask) is a soil scientist by education, which necessitates handling soil and tromping in all kinds of terrain.

But even before earning his PhD in the college, he had training in physical anthropology and archaeology, and was an exploration geologist in Saskatchewan,

Manitoba, and the Northwest Territories. On top of that, he was a geological technician in the oilfields of Alberta.

What he has learned over time is that being out standing (and digging) in the field is, in fact . . . outstanding.

“I had a fair amount of experience looking after field crews and doing field work,” he said of his geology years. “One of the reasons why the college hired me was the soil background, but also that I was quite used to looking after people

in the field.”

He joined the college in 2008 and quickly became engaged with the renewable resource management program. Its field course was considered the flagship.

“They needed someone who could handle students in the field for many days at a time.”

His passion for soil and an understanding of the importance of connections drive his goals for his term as academic dean.



## Overarching vision

"There are really two main things I'm interested in doing," said Yates. "They're related to or part of something the college already has strength in.

"One of them has to do with connections between First Nations and the college. We have several ways we're doing that. There's the KA (Kanawayihetaytan Askiy) program and there's the kihci-okâwimâw askiy Knowledge Centre."

He has long been collaborating with First Nations, in his role as professor, through a field course and a group project course that often involved being in the field. In one case, he had permission from One Arrow First Nation to access its land north of Duck Lake, part of the Nisbet Forest, where he taught students about soils and mapping.

"The land managers would come out from One Arrow and meet with the students," he said. "If we could, we'd have students come from the school at One Arrow, which is Almighty Voice, and they would interact with my students.

"In my fourth-year course, the last several years I've been doing projects in collaboration with a First Nation, just recently with Little Pine and also Mistawasis and Ile a la Crosse."

They're very rewarding experiences for the students, he finds. They get to interact with people and communities they had likely never met before.

"It serves as an example of the things you can do, and the university programs you can take, that still allow you to do things of importance to the community," he said.

"I'd like to find ways of extending those experiences to other courses in the college. It's a much better experience for everybody and more appreciated if we're going out and being present in their communities."

His second goal is centred around professionalism.

"I'm a practicing agrologist and a member of the Saskatchewan Institute of Professional Agrologists," explained Yates. "The college is a professional college, but the public doesn't always think of us that way. I'd like to promote us more as a professional college. A lot of that

has to do with the undergrad students' understanding of what it means to be a professional."

Among his plans to achieve this is potentially using the undergraduate clubs as a vehicle to improve this understanding.

A third related piece that fits in with the agrology theme is looking for more opportunities to collaborate with industry.

"I've always had positive experiences collaborating with industry," said Yates. "We always do a certain amount of that, but it would be interesting to collaborate further, whether through student internship programs, bringing in guest speakers or lecturers, field courses, and getting more industry professionals involved in that.

"There's a lot of willingness to collaborate or provide mentorship and authentic learning experiences. Industry is looking to make contact with students because students are potential employees. It also improves the soft skills of the students themselves.

"It's not so much about addressing a problem as enriching the students' experiences."

These experiences also help build connections, which is foundational to career success.

## New in educational opportunities

Yates is also coming in at a time when three programs at the college are either being changed or launched.

New this year is the Certificate in Precision Agriculture, and that's a "really nice addition to the college," he said.

"It advances us in terms of teaching in the area of digital agriculture. This is collecting massive amount of data in the field captured by drones and sensors and learning how to process it. It's probably one of the key ones right now.

"It's long overdue, and really modernizes a lot of our teaching in our agronomy programs. I suspect there will be other ways to extend that into some of our other current programs as well."

The second addition is a new degree program out of the Department of Food

and Bioproduct Sciences: Bachelor of Science in Food Industry Management.

The degree was created to meet industry demand for graduates with interdisciplinary training in food science, agribusiness and marketing, preparing them for jobs in the booming agri-food sector.

There are also changes coming to the undergraduate Kanawayihetaytan Askiy (KA) program.

"This program is not new, but what is new is that the college is making it possible for high school students to enrol directly into the two KA diplomas without having to complete the KA certificate first," said Yates.

"We're expecting that to be more accessible," he said, adding that application dates will be changed.

"Its purpose is to provide an area of study and a credentialed certificate for Indigenous land managers. It's really the sole purpose, to train them in various aspects of land management both on the legal side and environmental side."

Whatever courses of study students choose, Yates hopes they never feel boxed in. There are many options and huge opportunities.

"I say to my students, 'don't be afraid of what you're doing or trying,'" said Yates.

## "Don't be afraid of what you're doing or trying."

DR. TOM YATES (PHD)

"I had four or five careers before this one. When it wasn't working out, I made a change. Sometimes it was scary because when you have a family and kids, it can be pretty scary. But if you're making changes that will be potentially better for everyone in the end, it's worth a try." ♥

# Gaining land management knowledge supports community

 JANE CAULFIELD

**Earning the Kanawayihetaytan Askiy Certificate at the University of Saskatchewan (USask) helped Melissa MacDonald grow into her position as Land Director for the Membertou First Nation.**

Melissa MacDonald  
*Photo submitted*

Land is a fundamental right and important asset for First Nations across the country. It contributes to their economic prosperity, provides space for housing, and supports the health of the community. But to ensure the land continues to be beneficial well into the future, a team of professionals are often tasked with the duties and responsibilities of land management.

“Land management is the professional term for the day-to-day activities that go into taking care of reserve lands, including the environment and available resources,” said Melissa MacDonald, land director for the Membertou First Nation in Nova Scotia.

MacDonald is honoured to be land director for Membertou and is grateful for the knowledge she gained as a student in USask’s College of Agriculture and Bioresources Kanawayihetaytan Askiy Certificate program in 2019/20. The specialized certificate program is designed to highlight a broad range of topics to examine the basic environmental, legal, and economic facets of land and resource management to support Indigenous communities.

“The program gave me the foundation for my current position,” said the 2020 graduate of the program. “I gained knowledge and developed skills that have made me an asset to my community.”

### Land management helps a community thrive

Membertou is a progressive urban Mi’kmaq community located on Unama’ki – Cape Breton Island. And for nearly 30 years, the community has worked hard to ensure its future is promising and bright. To achieve this, chief and council came together and developed major goals that would guide each strategic decision moving forward. One goal developed looks to forge a new economic frontier that blends contemporary innovations with the Indigenous knowledge-based principles of conservation and sustainability of resources for the land and waters.

“We do a lot,” said MacDonald. “We look for ways to support our community through responsible use of the lands, while also monitoring environmental and conservational issues. We are stewards of the land.”

Home to more than 1,300 people, Membertou participates in community events within the Cape Breton Regional Municipality while still maintaining a sense of autonomy. As land director, MacDonald and her team are responsible for several aspects of life in Membertou that help ensure their culture and heritage continue to flourish. From the preparation of land transaction documents to maintaining and protecting historical data, they diligently take care of the lands that Membertou calls home.

### A program that fosters growth

Before MacDonald joined the Kanawayihetaytan Askiy Certificate program she had been an employee at the Membertou First Nation for more than a decade, working in various areas including employment resources and tenant relations. The certificate allowed her to grow her skillset so she could continue to support her community in new and exciting ways.

“The program at USask was highly recommended by past graduates in my own province of Nova Scotia and from others across the country,” said MacDonald. “I heard the support team, the instructors and the class content and experiences were great and they were right. Working closely with others in the program helped me to develop a network of lands professionals who I can rely on, and they can rely on me to give information and share experiences.”

**“We look for ways to support our community through responsible use of the lands, while also monitoring environmental and conservational issues. We are stewards of the land.”**

MELISSA MACDONALD

Throughout the program, students are given the opportunity to learn about several areas important to their communities including Indigenous rights, land use planning, intellectual property law, and project management. Once completed, students are qualified to participate in the Professional Lands Management Certification Program (PLMCP), which is offered by the National Aboriginal Lands Management Association—something MacDonald proudly undertook as well.

Even though MacDonald had to travel between Nova Scotia and Saskatchewan three times a year to complete classroom-based experience, she said the knowledge she gained was worth it.

“The outdoor, hands-on activities took me out of my comfort zone,” said MacDonald. “I got to dig in the dirt and test soils. I am afraid of bears and other wildlife, but the instructors and others made it a comfortable and interesting experience that I enjoyed very much.”

Above all, MacDonald said that the instructors went above and beyond to ensure that each student cultivated their own success.

“The people that I made memories with—my instructors and my classmates—are now some lifelong friends,” said MacDonald. “I’ve learned a lot from all of them.”

When it comes to giving advice to future students, MacDonald said that each student should make sure they enjoy the ride.

“Soak in all the knowledge. Make connections. All of our communities are unique, but we all share similar barriers, celebrations, and experiences,” said MacDonald. “The winter can be very cold; you will get through it.” ♥

# Flaman and BoMill change the game in seed research



Mitch Flaman, Dr. Rex Newkirk (PhD) and Dean Angela Bedard-Haughn with the BoMill Seed Sorter donated to the College of Agriculture and Bioresources by Flaman.

## IAN GOODWILLIE

Crop production is not just a game of maximum yield; it is, more importantly, a game of quality. No farmer wants to pull a subpar crop off the field or put subpar seed in the ground.

Superior quality yield and accurate seed grading is better for everyone involved along every step of the process. And it all starts with good research.

That's where the BoMill Near Infrared Seed Sorter, aka the BoMill IQ, comes in. Donated to the University of Saskatchewan

(USask) College of Agriculture and Bioresources (AgBio) by Flaman, this innovative piece of technology is already changing how seed is sorted. Wavelengths of infrared light with specific calibrations are used to determine a seed's chemical composition. The BoMill IQ then sorts individual kernels of grain into one of six fractions.

"The idea behind the BoMill technology is to use every kernel for what it is best suited for," said Andreas Jeppsson, CEO of

BoMill. "The grain industry has until today been determining the quality by taking a few samples from each batch of grain, and based upon the average results of those samples, the quality of a batch is set."

The infrared sorting system the IQ uses allows for individual sorting on a much deeper level, eliminating the assumptions that come with batch averages. How this incredible piece of technology came into the hands of AgBio is a simple story of the generosity of one group.



Photography by Carter Johnson

Flaman is a well-known company across Canada. While it is involved in a variety of ventures, it's best known as one of agriculture's strongest partners.

"Agriculture is where the Flaman roots started, and we are happy to contribute to continued innovation in the Western Canadian ag industry," said Mitch Flaman, senior manager marketing and IT at Flaman.

It was Flaman which first brought the BoMill Near Infrared Seed Sorter to the

region. And it was immediately on the radar of Dr. Rex Newkirk (PhD), an associate professor with AgBio.

The IQ wasn't the first piece of BoMill equipment Newkirk had worked with over the years. The Canadian Feed Research Centre (CFRC) at USask has the TriQ. A major difference between the two units is the fact that the IQ is smaller and portable, meaning it can be used on site rather than just in the lab.

According to Newkirk, what sets the IQ apart from the TriQ is even more amazing.

"The new BoMill IQ donated by Flaman allows us to work on much smaller quantities of seed, advancing our research without the need to sort multiple tonnes of each product. The IQ also has the newest calibrations and software, allowing us to conduct a wider range of research."

The connection between AgBio and Flaman has run deep for years. Flaman has long been a supporter of various aspects of the college's work. That includes supplying equipment to the CFRC as well as equipment for use on campus. Not only has the company supported research done at the CFRC and the college, but it has also played a big part in bringing the results of that same research to prairie producers.

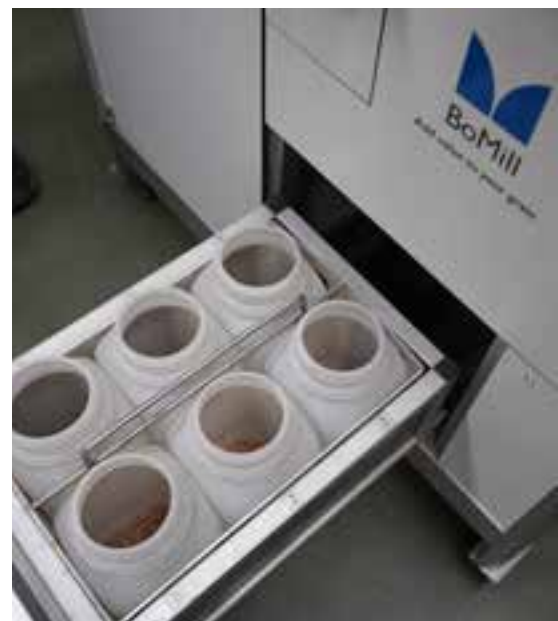
Flaman is keenly aware of the strength of this connection. "The University of Saskatchewan does tremendous work, contributing to AgBio, and having a close relationship with them is something we are proud of."

As such, this donation is another major step on a path the two organizations have walked together for a long time. But this act of generosity in particular has resonated with Newkirk.

"This is an important donation," said Newkirk. "Not only does it assist us with research using the most recent technologies, but it also gives us the opportunity to use the technology in our teaching program. Our students need experience and exposure to the most recent advances in processing technology. Without access to the equipment, the students would not have the opportunity to get hands on experience with the technology."

Flaman's donation could prove to be equally important for BoMill, as well.

"This is a very good initiative and a great opportunity to assess how BoMill



Wavelengths of infrared light with specific calibrations are used to determine a seed's chemical composition. The BoMill IQ then sorts individual kernels of grain into one of six fractions.

technology can create value and benefits with the different stakeholders throughout the grain industry supply chain," said Jeppsson.

AgBio grad students have already incorporated this new technology into their research. Newkirk mentioned master's student Meghan Taylor who used the IQ to sort fusarium-infected wheat and recovered a much larger amount of good quality grain than other cleaning methods could have achieved.

BoMill's Near Infrared Seed Sorter may be a relatively recent addition to AgBio's research arsenal, but it's already making an impact. And without Flaman's support, the technology simply would not be here.

Newkirk is thankful that Flaman stepped up, noting these kinds of partnerships are key to the long-term success of AgBio and its students.

"Without this donation of the IQ, we would not have the smaller more advanced unit that can be used anywhere in the college for both teaching and research," he said. ♥



# A life in wheat

**As Dr. Pierre Hucl (PhD) steps down as a Strategic Research Program (SRP) chair, he reflects on the evolution of wheat breeding in Canada and looks ahead to a bright future.**

 CLARE STANFIELD

Dr. Pierre Hucl (PhD)

*Photography by David Stobbe*

Public wheat breeding programs, as we know them today, weren't always a given.

When Dr. Pierre Hucl (PhD) began his career at the University of Saskatchewan (USask) Crop Development Centre (CDC) in 1990, publicly funded breeding programs were more academically focused, somewhat territorial about funding, and not making much of a dent in terms of commercial success.

Today, farmer-directed, publicly funded, collaborative wheat breeding programs are the norm on Canada's agricultural landscape, and they are regularly producing highly successful varieties like CDC Teal, a juggernaut from years past, and CDC Utmost, a more recent breakthrough for wheat genetics.

"Prior to the creation of the CDC in 1971, crop breeding programs were run by the academic faculty and designed mainly to train grad students and publish papers," said Hucl, professor in the Department of Plant Sciences and the outgoing chair of Canada Western Red Spring (CWRS), Specialty Wheats and Canaryseed Breeding and Genetics with the Ministry of Agriculture Strategic Research Program (SRP) after 33 years of service.

During that 33-year period, Hucl not only had a front-row seat to the evolution of wheat breeding in Western Canada, but he also had a hand in it.

## **From little acorns...**

While the SRP was only formally established in 2006, it was born of a funding model that had been operating out of the CDC since its inception. Hucl recalls the push to improve and re-focus university-based wheat breeding programs.

"When I started in January of 1990, the program had released three varieties and did not have a substantial market impact," he said, adding that the focus was mainly on research and graduate student training. In other words, grad students were trained in the science of plant breeding, but resources were not always aimed to support developing new, commercially viable wheat varieties.

After being hired, Hucl set out to transform the CDC's Spring wheat breeding program.

"At that time, there was a lot of turf protection," he said of some of the publicly funded institutions around in 1990. "There was huge pressure to not have universities



receive farmer-levy check-off funding and I had to be pretty scrappy to get that. Without that funding, we wouldn't have been able to grow and expand our breeding programs. Without the Western Grains Research Foundation wheat checkoff, there wouldn't have been wheat breeding at the CDC after 1995-96."

That program expansion had, and still has, a huge impact on the CWRS wheat landscape.

"At our peak, we had 25 to 30 per cent market share," said Hucl of CDC-developed wheat varieties.

### Reshaping the wheat breeding sector

"The CDC is a unique unit," said Hucl. "We're small—only eight scientists—and I think our impact is greater than many other institutions in terms of finding solutions to problems. We've been successful because we've adopted appropriate technology along the way."

He recalls how, in the early days, the CDC was scoffed at by some funders for adopting the use of molecular genetics in its breeding programs. "We got denigrated for doing that!" he said, laughing. But they stuck to their guns because it was the right technology to address farmers' needs.

Wheat breeding priorities shifted over the years as the industry evolved. Hucl recalls the demise of the country elevator system in favour of inland terminals. "Right away, this drove a shift toward larger bulk shipments," he said, adding that with WGRF funding, a concerted effort was made to develop wheat classes other than the dominant CWRS and Amber durum market classes, to meet a diversification need. Unfortunately, these wheat market diversification efforts did not pan out in the long run.

"Regardless, we've seen tremendous improvements in grain yield over the last 10 to 15 years alone," said Hucl. "That change feeds into larger farms and greater efficiencies."

CWRS wheat breeding was also spurred by the introduction of dwarfing genes that came directly from CIMMYT (the International Maize and Wheat Improvement Centre in Mexico) in the 1960s. But Hucl said the real game-changer for Canadian wheat breeders came in 2007 when the requirement for kernel visual distinguishability (KVD) was dropped as a condition for new variety registration.

"The Americans did away with it in the 1960s," he said.

It meant that while American breeders could focus on simply improving wheat, Canadian breeders had to kind of reverse engineer genetic material into new varieties in order to get the quality improvements demanded by industry while still meeting KVD requirements. The result was that many potentially great CWRS varieties never made it past the registration testing stage.

"I had a doubled haploid candidate line, so pretty pure, in registration trials," recalled Hucl. "It passed KVD two years in a row and in the third year 10 per cent of kernels looked like winter wheat and it was turned down."

By the early 1990s, Hucl said North Dakota State had good wheat varieties close to CWRS quality and when KVD died, that freed Canadian breeders. "Once that germplasm was introduced here, it was a game changer to successful yield improvement of CWRS wheat."

### The next generation

"I've been fortunate that I've ended up in this role," said Hucl. "I was just hired to work on wheat, but if you look at the vision statement of CDC—diversification is central.

I started looking at specialty wheats and then canary seed. I've always been interested in diversification. I've even tried dryland rice and peanuts!"

He has also seen an even more important shift over the years—people choosing agriculture.

"When I started, parents were discouraging their kids from going into agriculture," said Hucl, adding that from the early- to mid-1990s the CDC experienced something of a collapse of interest in agriculture as a career. "Our department went from 100 grad students to 40. We've managed to rebuild that core of students to about 90 now. In that group, we have a lot of really smart grad students who are good at articulating what they're doing through social media. It's a good sign for the future."

The role of the CDC at USask is also key.

"All the background work that needs to be done is in the public sector—that's our role: to be the guardian, the backstop of the genetic erosion," said Hucl. "Once a breeding program is gone, it takes 10 years to rebuild."

**"All the background work that needs to be done is in the public sector—that's our role: to be the guardian, the backstop of the genetic erosion."**

DR. PIERRE HUCL (PHD)

In July this year, Hucl passed his SRP chair baton to Dr. Adam Carter (PhD), assistant professor in the CDC and Hucl's office neighbour.

"Adam's office is next to mine so whenever he has a question, he knocks on my door, and we go and look at things together."

And he has no doubts Carter is the right person for the job.

"He's very passionate about plant breeding." ▀





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# Scaling up Saskatchewan's potential

**Edgar Martinez used AgBio's Bioprocessing Pilot Plant for his graduate program. Now he's running the show.**



Edgar Martinez in the Bioprocessing Pilot Plant.

*Photography by David Stobbe*

## JOANNE PAULSON

Edgar Martinez knows how to make connections, both scientifically and personally.

On the science side, Martinez is an engineer who has worked on projects ranging from biomedical devices to canola seeds.

On the personal side, he has served as the vice-president Student Affairs for the Graduate Students' Association (GSA), and having been a teaching assistant for four years, also received the College of Engineering's Remote Teaching Award in 2021.

Until recently, he was also a full-time student, very close to achieving his PhD, and a full-time University of Saskatchewan (USask) staff member: he was appointed co-ordinator of the College of Agriculture and Bioresources' (AgBio) Bioprocessing

Pilot Plant (BPP) in February 2022. One may wonder when he sleeps.

Originally from Mexico City, Martinez came to USask as an international student already armed with a Bachelor of Mechatronics Engineering from the Universidad Panamericana in his home city, where he also worked as a hospital biomedical technician.

Upon arriving in Saskatoon, he took English courses at the university's Language Centre and then was accepted to study for a master's degree in mechanical engineering.

Supervised by mechanical engineering professor Dr. Chris Zhang (PhD), Martinez worked with human cells in microfabrication and created a biomedical device. Based on his

success, Zhang offered Martinez a continuation to a PhD.

“He saw that I was interested in small particles, and he thought maybe I could apply that knowledge to canola seed,” said Martinez.

Zhang contacted AgBio’s Dr. Martin Reaney (PhD), who became Martinez’s co-supervisor, “and that’s how I ended up where I am right now,” he said.

“I love the university. I have seen the university in different capacities. I was the vice-president for the GSA and so I have seen the university from several points of view . . . I have had that privilege of being involved in numerous roles during my graduate studies. The university feels like home.

“From the beginning, the university has opened doors for me. It’s a place where I feel welcome.”

### **BPP supports researchers**

The Bioprocessing Pilot Plant’s mandate is to support researchers, both from across campus and externally, with a range of bioprocessing research activities.

The research facility, located on the sixth floor of the AgBio college, is equipped with state-of-the art equipment to isolate, recover, and purify plant and crop constituents.

However, the plant is not solely in place for crop and food development. Students and faculty from various disciplines are also engaged in the design of drugs, vaccines, bioproducts and other human and animal health advancements.

Martinez runs the show, with supervision from Associate Dean Research and Graduate Studies Trevor Crowe.

“I provide assistance with research projects, I provide training for students, and training also for external stakeholders. For example, we have contracts with companies who use our services and equipment here,” Martinez explained.

“We work mainly for Saskatchewan companies, but we can also have national and international projects,” he said, noting these companies pay for the training and use of the plant.

“The main goal is to support research in the College of AgBio and for other units such as the Department of Chemical and Biological Engineering.”

In a completely unrelated coincidence, and a good example of the plant’s usefulness, Martinez himself used the BPP for his own PhD project which focused on methods to dehull canola.

### **Increasing the value of an important prairie crop**

Today, canola crushing—a crucial industry on the Canadian Prairies—simply smashes the entire seed, oil-bearing kernel, husk and all.

Canola seed, Martinez explains, has protein content of about 30 per cent, but the remaining meal if hulls are removed can reach protein concentrations of up to 50 per cent.

“Unfortunately, that (meal) protein is usually waste because after oil extraction, the meal is mixed with the hull,” said Martinez.

“The hull has lots of fibre and that fibre cannot be digested by humans, or chickens or fish; it can only be digested by ruminants.”

Dehulling, or removing the external shell, therefore leaves a meal with a high quantity of protein and low fibre.

“That protein can be purified and used as a food ingredient for humans or for animal feed,” he said.

There are two types of dehulling—after oil extraction, or tail-end dehulling, and front-end dehulling. Martinez’s research focused on the latter.

“The challenge is that the seed is very small—two millimetres in diameter as an average—and there is a very tight connection between the kernel and the shell.”

He offers a comparison to peanuts, wherein the meat is not attached to the shells.

“Here the canola seed is in physical contact with the hull. Whatever you do to the hull, the damage will transfer directly to the seed.”

For that reason, he sought a method for tempering the seed before applying physical force to it.

“We added heat and moisture, and we were able to separate the seed internally from the hull. We were able to create a gap, just like in peanuts, without applying any force to the seed. That little gap between the seed and the hull is very small; it is a few microns. But it protects the seed so we can apply some force without transferring that force to the embryo, to the kernel.

“We don’t want to break the seed or cause damage because as soon as we break the seed there is some oil lost.”

Having measured the gap between seed and hull using X-rays, he then used rollers to break the hull in half. Once separated, the kernels could be separated from the broken hull with blown air.

His project was based on analyzing one seed at a time to determine a method that could be scaled up, and that is a major aspect of the BPP: doing the research, yes, but also figuring out how to scale up the technology.

Martinez has published his findings and defended his dissertation in September. His project now complete, Martinez finds that managing the BPP is advancing his knowledge in other ways.

“Although my PhD was on one specific project, I now am involved in several projects. My background is in machines, but I’m learning more about processing food and chemistry.”

And the BPP is another demonstration of how USask colleges work together and intertwine.

“We cannot be isolated. The problems are so complex; they are interrelated,” said Martinez.

“We are working on promoting the space and making it available for everyone. We are here to support more research in the college, and other colleges.” ■

# Braiding Indigenous and Western knowledge

**Newly opened in July 2023, the focus of the kihci-okâwîmâw askiy Knowledge Centre is on taking care of Mother Earth.**

 **JOANNE PAULSON**

On July 5, a pipe ceremony honoured the founding of the kihci-okâwîmâw askiy (Great Mother Earth in Plains Cree) Knowledge Centre on the University of Saskatchewan (USask) campus.

Considering the work involved in reimagining the former Indigenous Land Management Institute into a new entity, it came together quickly.

It was early 2022 when College of Agriculture and Bioresources (AgBio) Dean Angela Bedard-Haughn started the process, soon joined by director Candice Pete-Cardoso, academic director Dr. Melissa Arcand (PhD), and a steering committee.

The group dove in, led by the founding principle that “the land is our first teacher and of central importance to Indigenous peoples.” Its purpose is to serve as a resource for Indigenous

communities and organizations seeking information, training, and research partnerships.

“We have a robust steering committee, comprised of Indigenous peoples from various nations and Indigenous-led organizations,” said Pete-Cardoso.

The steering committee members represent the areas of Treaty 4, Treaty 6, Treaty 10, Métis Local 10, and the regions of Syilx Okanagan and bigger Liḡw’idaḡw Nation.

“The steering committee members also represents six different Indigenous language groups,” said Pete-Cardoso, who serves as co-chair with Arcand.

“The steering committee members are a strong collective voice; they emanate the meaning of leadership for collective



impact. It was those voices that lead the development of what an Indigenous land centre should and could look like.”

One of those voices is Robin McLeod from the Prince Albert Grand Council, a consultant who works with lands and resources files for the council.

“We have an MOU with USask,” said McLeod. “We’re trying to make the best use of it. We are working on projects involving USask. This is something we identify as being part of the MOU.”

A specialist in business plan development, McLeod said his input was focused more on his land experiences.

“I helped with my knowledge about the land. I was raised on the land,” said McLeod.

“Others on the steering committee have also contributed Indigenous knowledge. I wanted to make sure that Indigenous knowledge was part of the moulding of the centre. We want to be part of it as Indigenous people.”

One of McLeod’s direct impacts came from his interest in seeing Indigenous knowledge intertwined with Western knowledge.

“We call that ‘braiding knowledge,’” which is symbolized by a braid of sweetgrass. “My goal was to make sure that happens. What we want to see is the acknowledgment of Indigenous knowledge in science.”

He hopes the centre can one day have its own building and provide services such as mapping of Indigenous lands.

“I think there needs to be more collaboration like this,” he added. “I think that’s a great thing. We do have lots to contribute, and I think this is one of the ways to do it.”

## Creating the vision

True to the vision, the centre’s name, its land acknowledgment statement, and its driving principles are expressed in the Plains Cree language.

While considering these important elements, the committee thought about the many references to reconciliation and Indigenization in USask foundational documents.

That led to an examination of the word “institute,” which the steering committee felt represented negative connotations related to the Indian residential school experience. The decision was taken to change the name.

“The name that we chose, kihci-okâwimâw askiy, came from the steering committee, came from Elder Joseph Naytowhow (with the College of Law),” said Pete-Cardoso.

The centre also received a prayer from language keeper Leo Yahyahkeekoot which will serve as the land acknowledgement for the centre.

The statement focuses on honouring Mother Earth, Pete-Cardoso said.

It is expressed in Plains Cree, one of the languages in Treaty 6 territory upon which the university exists. Briefly translated to English, it says: Great Mother Earth, you guide us, we are obligated to live in a good way, we must take care of her, and we must respect her.

“The other important aspect to this work was changing the narrative,” said Pete-Cardoso.



Bison in Grasslands National Park.

“My career over the past 24 years has focused on working with Indigenous communities. One of the concerns they have raised is being classified as stakeholders. We need to work on changing that narrative: Indigenous peoples are individual and collective rights holders.”

To that end, “Nothing about us without us” was another important theme that the steering committee adopted for guidance, she added.

Ultimately, the development plan that emerged melded respect and language with the practical aspects of operating such a centre.

“When I started last year, I asked myself, what should this look like?” said Pete-Cardoso. “How do we work with Indigenous communities in a respectful and meaningful way?”

“One of the first things was connecting with Indigenous communities and organizations working in this area,” which included the Saskatchewan Aboriginal Land Technicians in Saskatchewan and the Lands Advisory Board in British Columbia, Pete-Cardoso said.

**Connection Point: How it works**

Fundamentally, the centre works with and for Indigenous communities to empower land governance by leveraging teaching, research and engagement at USask, said Pete-Cardoso.

The centre will work across a diversity of disciplines at the university and will support and foster the development of reciprocal relationships.

One of the initiatives is an Askiy (“land” in Plains Cree) professional development workshop series starting in the fall.

Indigenous peoples working in land management will have the opportunity to participate in workshops and training on multi-disciplinary land-related issues. Presenters will include Indigenous organizations and faculty from USask, including Arcand.

Future plans will largely be driven by the steering committee and will be based on priorities voiced by Indigenous peoples. Pete-Cardoso looks forward to receiving this advice and guidance.

“We’re trying to change how things are done. It’s about Indigenous peoples being at the table and driving the outcomes of the work.”

She gives the example of a project by Dr. Tom Yates (PhD), associate dean academic with the College of AgBio, who worked with fourth-year students and the Little Pine First Nation to build meaningful relationships.

“The students took soil samples of the lands that were being leased to test and compare the results to the original soil samples gathered in the ‘60s, to determine if the land was still in a healthy state,” explained Pete-Cardoso.

They also took samples from the Battle River, examined food security challenges, and provided recommendations to the community who would then decide on next steps.

The centre also plans to create an Askiy Mentorship Team and an Askiy Research Lecture Series, both intended to support and share research being conducted at USask, Pete-Cardoso said.

“The priority for the centre is about creating land-related teaching, research and engagement opportunities that are of significance to Indigenous communities.”



Steering committee members and guests at the launch ceremony for the kihci-okāwimā askiy Knowledge Centre held on July 5, 2023.

*Photo submitted*

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We also celebrate those who have planned a bequest to the College of Agriculture and Bioresources. These arrangements help shape and secure our college's future.

# WGRF Integrated Agronomy Chair focuses on sustainable cropping systems

 KATHY FITZPATRICK

**“We try things that people are thinking about but perhaps not trying themselves.”**

**DR. MARYSE BOURGAULT (PHD)**





For Dr. Maryse Bourgault (PhD), multi-disciplinary research in sustainable agriculture goes far beyond crop physiologists, soil scientists, plant pathologists, and other scientific experts. The conversation extends to agricultural economists, executives of food processing companies, consumers, and most crucially, farmers.

Of new practices and technologies, producers want to know “how much does it cost, how much can I save, and how much is it going to make me?” Bourgault recalls hearing from Kathy Larson, a professional research associate in the Department of Agricultural and Resource Economics in the College of Agriculture and Bioresources. “These are the questions that we also want to consider,” said Bourgault.

Bourgault arrived at the University of Saskatchewan’s (USask) College of Agriculture and Bioresources in March 2020, as the first Western Grains Research Foundation (WGRF) Integrated Agronomy Chair.

Prior to that, she earned a PhD in crop physiology at McGill University’s Faculty of Agriculture and Environmental Sciences. Bourgault then spent nine years in Australia, completing two post-doctoral fellowships at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the University of Melbourne, followed by 15 months as an extension officer with the Queensland State Department of Primary Industries. From there, she went on to a research centre at Montana State University. She also found time to complete an MBA in agribusiness from Université Laval in 2021.

Bourgault’s ultimate mission at USask is to help improve soil management and increase crop production in sustainable ways. She aims to look at sustainability through multiple lenses: environmental, economic and social. She wants to assess how new practices fit into the overall farming system and affect quality of life and examine their potential for widespread acceptance.

In planning her research, one of Bourgault’s earliest activities was to ask farmers what they felt were their most pressing issues, and what the solutions with the greatest impact may be. She said cover crops—a “fairly new” practice—was one topic raised. It’s thought that covering the soil with crops such as clover or alfalfa, especially early and late in the growing season, can reduce wind erosion and fix nitrogen in the soil as well as draw in moisture from snow melt and rain. That benefits other crops planted in the same soil, such as wheat and canola.

## **“Sometimes the interesting results are not what worked but what didn’t work.”**

DR. MARYSE BOURGAULT (PHD)

Bourgault said interest in this practice is growing, due in part to its promotion by Farmers for Climate Solutions, a group advocating to make agriculture part of the solution to climate change. The group offers farmer-to-farmer mentorship, but even so “people are desperate for information on what works and what doesn’t. And there is no sound scientific information behind it,” said Bourgault.

Cover cropping is now another one of her projects, in collaboration with partners Dr. Linda Gorim (PhD) at the University of Alberta and Dr. Yvonne Lawley (PhD) at the University of Manitoba.

Another practice, placing the fertilizer phosphorous more deeply in the soil where it can reach plant roots, is also catching the attention of farmers in Saskatchewan. It’s now the subject of a research project being conducted by Bourgault’s technician from Montana, who came to USask for a PhD program. Bourgault noted that there has not been much work done on placing phosphorous at depth since the introduction of no-till farming, which has resulted in the common practice of placing fertilizer within five centimetres of the soil surface.

Part of what drew her to the position at USask was the chance to investigate

**Dr. Maryse Bourgault (PhD), Western  
Grains Research Foundation (WGRF)  
Integrated Agronomy Research Chair**

*Photography by David Stobbe*



alternative farming practices, including reintegrating livestock into grain crop production. The strategy is part of an approach known as regenerative agriculture, so named for its aim to mitigate climate change by sequestering carbon while restoring soil health and biodiversity, reducing the use of water and other inputs, and improving farm productivity and profitability.

For Bourgault, the college's central location on campus, the opportunity to teach and interact with students, and the broad range of disciplines at the college were important draws. So was the possibility of accessing the Livestock and Forage Centre of Excellence in nearby Clavet, Sask.

"I could see a lot of possibilities, a lot of needed research, and good support from the industry," said Bourgault.

Her role is supported with \$2 million in funding over seven years from WGRF, a farmer-funded and farmer-directed non-profit organization.

One of Bourgault's reintegration studies involves a closer working relationship between the production of field crops and livestock grazing. "They call me 'the fence lady,'" she said, smiling, for the extensive network of electric fences weaving through her test plots. The thinking is that "livestock grazing, with the manure that comes with it, might help with carbon sequestration and soil health in cropping systems," explained Bourgault.

As well, she is looking at potential winter crop rotations, along with new winter crops with the goal to offer less susceptibility to drought and August heat. Winter camelina in the 2020-21 crop year was one success.

Early in the 2020 growing season "everyone was panicking because it was so dry. For us, by the time people were starting to get worried, the winter camelina was maturing," she said.

A two-year study on intercropping various legumes with cereals or oilseeds (planting alternating rows) yielded some surprises.

"Sometimes the interesting results are not what worked but what didn't work," said Bourgault.

For instance, it turned out oats and wheat are too competitive to intercrop with faba beans, and legume monocrops were better at improving the soil health indicators considered. One encouraging result came from intercropping peas and canola. It saved about 30 pounds of nitrogen per acre, because the canola did not have to be fertilized—the nitrogen-fixing peas did the job.

"That was pretty amazing," said Bourgault, noting a multi-year study to see how much fertilizer can be saved over time may be worth undertaking.

Bourgault also wants to make sure the solutions she investigates translates to field-scale production and are sustainable, perhaps by having farmers test new practices with their own equipment.

"There might be real barriers that we don't see because that's not part of our reality," she explained. She said so far it has been difficult to find money to compensate participants and will take more work to persuade funding agencies of the value in doing this.

Beyond the technical questions, Bourgault sees the need for discussion across society of what constitutes sustainable or regenerative food production. If farmers, food processors, and consumers hold differing views, there is potential for conflict and the erosion of trust.

She also sees a role for social scientists in assessing the potential for consumer acceptance. Noting that intercropping, for example, is an easy sell because the fields often look so pretty, Bourgault said "people see that, and they feel good inside." She wonders if people can be persuaded "to pay a little bit more of a premium for crops that are grown in a different way."

There are many urgent questions involving many players about how to grow higher-quality food and more of it, more profitably and sustainably, in changing climates. For her part in finding answers, Bourgault believes "it's not difficult to see the impact that we'll have on society." ■



# Wild rice research puts Indigenous communities at the forefront

**Understanding wild rice diversity isn't just about crop improvement, it's also about respecting and empowering Indigenous communities.**

 CLARE STANFIELD

Aerial view of wild rice growing at Meeyomoot Lake, Sask.  
*Photography by Dr. Tim Sharbel (PhD)*

Dr. Tim Sharbel (PhD) has always been on what he describes as the sharp end of biotechnology. A professor in the Department of Plant Sciences, College of Agriculture and Bioresources at the University of Saskatchewan (USask), Sharbel's work focuses on apomixis, asexual seed formation in flowering plants, a 20-year project involving high-tech evolutionary genomics methods.

If you are picturing molecular biology and microscopes, you are not wrong. But Sharbel is also working on a wild rice project that adds a whole new dimension to this scenario—a very human one, which begins with building relationships.

"It's very exciting for me personally," said Sharbel. "I've spent the last 20 years of my life in biotech, and now I go to meetings to listen to Elders and am learning a great deal."

Those meetings are to discuss a new, multifaceted project to support Indigenous communities as they work to enhance the wild rice industry. About a year ago, Sharbel and his team began to work with rice samples from some of Saskatchewan's northern lakes, but the road to get those samples to his lab was not a straight or easy one.

"It is taking a lot of time and effort and building trust to get it going," said Sharbel.

It could not be business as usual: get funding, get rice samples, get started.

"It's a very human, very important industry, with a plant that has been traditionally harvested for many hundreds of years," he said, referring to First Nations wild rice production. "But it faces many problems, from planting through to selling the seeds. We are focused on what the community needs, the problems they need solved."

**"It's a very human, very important industry. But it faces many problems, from planting through to selling the seeds. We are focused on what the community needs, the problems they need solved."**

DR. TIM SHARBEL (PHD)

Phyllis Smith couldn't agree more. A self-employed wild rice harvester from the Métis community of Pinehouse in northern Saskatchewan, Smith says that the more she and her fellow harvesters can learn about their specific growing environments, the better.

Hearing Sharbel speak at a harvesters' meeting in Prince Albert, Sask., Smith invited him to her community to meet the harvesters there and see how they could work together to make wild rice production in Pinehouse Lake better and stronger. That kind of cooperation and community buy-in is key.

### Partnerships and permissions

Sharbel recalls a multi-institutional effort made a few years to put some significant funding toward wild rice research, but without Indigenous input the idea was rejected.



PhD student Serena Page caring for wild rice in a growth chamber.

Photography by David Stobbe

"In the meantime, I'd become friends with Blaine Chartrand, a professor who heads Saskatchewan Polytechnic's BioScience Technology program and has deep Indigenous ancestry in Saskatchewan," said Sharbel.

He and Chartrand were both interested in working with wild rice, as was Bruce Hardy, founder and CEO of Myera Group in Winnipeg. Myera is developing technologies that help bridge the gap between sustainable food supply, good nutrition and a community's ability to manage and direct its own food economy.

Hardy, who is Cree-Métis, was looking for a plant scientist to help realize his vision of determining terroirs for Canadian wild rice—just like in the wine industry where a value is placed on the unique flavour characteristics conferred by a specific geography.

"It would create that unique value proposition so they can have a brand around the community," he said. "They can create a business model around it."

Because terroir is community-owned, in the future, wild rice with an identified terroir could potentially be grown on a mass-scale further south in a circular fish waste, soil-based system and sold for a competitive retail price. The community would earn royalties and gain a food dividend by being able to harvest local rice for local consumption or sale into premium markets.

While this is just a small slice of what Hardy envisions for the future of food and food production in Indigenous communities, Sharbel was very excited by the ideas. "He and I first spoke about four years ago," said Sharbel. "He was applying for money, and I

started talking to people locally here.”

Slowly, relationships were built, community connections were made, and funding found from several sources, including the Saskatchewan Agriculture Development Fund (ADF), Protein Industries Canada, and Mitacs (a non-profit research funding body).

Sharbel and his colleagues began to visit northern communities to speak with Elders about working with them to gain a better understanding of the biology and natural history of wild rice production in their communities, about preserving germplasm, improving yield and quality, and protecting the future of wild rice.

As communities came on board, they have agreed to let the team collect samples of wild rice from their harvests for analyses of phenotypic and genetic variation.

### Understanding the genetics of wild rice

“We have wild rice samples from about 15 or 16 lakes so far,” said Sharbel. “It’s just starting. We’ve got something like 50 lakes in total to look at. Hopefully, as we have some success, we’ll get more.”

Sharbel emphasizes that wild rice is not a monolith. Each lake has unique biological and physical characteristics, which means that wild rice populations have subtle differences based upon their history, origins, and genetics. Characterizing genetic variability of wild rice across the northern Prairies (and Canada) is the first step in understanding this traditional crop.

That starts with phenotyping and doing a statistical analysis on every sample.

“Once we do that, we can ask why they are different from each other by comparing genetic and environmental data.”

This is something that really resonated with Smith.

There are 10 wild rice harvesters in her community, each one harvests from a different lake, and they can see that grain quality, size, yield, and days to maturity differs from lake to lake, but they don’t know why. If they could find out, they could potentially use that knowledge to improve wild rice quality across all the lakes.

“There were no supports to help us work on growing more good quality wild rice, no way to get your soil and water tested,” Smith said. “And then Tim came along. I’m so glad that they want to do this. The more we know about where we’re growing our rice, the better.” So far, three harvesters from Pinehouse have sent Sharbel’s team soil, water, and rice samples from their lakes.

“We now have a PhD student on the team, Serena Page, looking at how we grow it,” said Sharbel. “We’re looking at the nuts and bolts of getting it to grow, and flowering is the focus now: Can we get it to flower inside a growth chamber? Can we get it to make seed?”

Sharbel explains that understanding wild rice reproduction is key.

“Seed is embryo and endosperm, and that endosperm tissue is a triploid—two genomes from mother, one from father. In the end, it’s the mother plant that determines things. Wild rice has 30 per cent more protein than white rice, more micronutrients and antioxidants. We want to see how the mother plant distributes that nutritional freight.”

Some of these answers will come from Dr. Pankaj Bhowmik (PhD), a senior research officer at the National Research Council Canada



Wild rice

Photography by Dr. Tim Sharbel (PhD)

who is doing nutritional analysis in his lab, in addition to protein localization analyses at the Canadian Light Source, to determine protein content.

Ultimately, Sharbel’s team and collaborators are DNA-fingerprinting each individual wild rice sample as well as the organisms with which wild rice interacts, for example the microbiome in the mud and water in which it grows.

“The deeper we look with technology, the more we see through evolutionary analyses how everything is connected on the DNA-RNA level,” said Sharbel. “The Indigenous view of the world is that everything is connected, and now high-tech data show us the same thing—it’s beautiful.”

### Sharing data in a meaningful way

In his first meetings with First Nations elders and communities, Sharbel heard “No GMO!” a lot, and was quick to assure people that he was not proposing to modify wild rice in any way. Rather, he advocated for the use of modern biotech tools to genetically fingerprint wild rice as it exists, then share community-specific findings with communities only, while making the aggregate data more widely available.

It is, said Sharbel, something like the DNA kits many people use.

“We’re not allowed to share the specific material with anyone but the community it comes from,” he said. “Only anonymized data will go into a general report.”

With this knowledge in hand, communities can make their own decisions about how to develop and market their wild rice crops, like medicinal foods and ingredients, for instance. Sharbel would also love to see a First Nations-owned and operated wild rice seed bank one day.

To him, this wild rice project is about how the power of biotechnology can lead to community empowerment and well-being.

“It spans spiritualism, Mother Earth and connectivity, modern genomics and breeding methods, and industry in a fair and balanced way.” ■

# Tackling challenges with feedlot nutrition

**USask graduate student Catherine Seidle adapts dairy-industry solution to discourage feed sorting by feedlot cattle.**

 KATHY FITZPATRICK

Just add water.

That's all it may take to maximize the nutrients beef cattle digest from barley when overcoming problems posed by variable kernel size—particularly feed sorting, where cattle pick through their diets.

Catherine Seidle, a graduate student in the University of Saskatchewan's (USask) College of Agriculture and Bioresources (AgBio), is testing the theory in two studies she is conducting for her Master of Science (MSc) degree in Ruminant Nutrition. Her research, supervised by Dr. Greg Penner (PhD), is funded by the Saskatchewan Barley Development Commission (SaskBarley) and the Natural Sciences and Engineering Research Council of Canada (NSERC) Alliance Grants program.

Seidle calls the variable kernel size of barley “an undesirable issue” for feedlot operators. In searching for a research topic with practical significance that would lead to a solution “easily adoptable by producers” and offer “instant results,” Seidle believes she may have found it.

“This is such an easy tool. Everybody has water,” she explained. “If adding water is all it takes to get a more consistent intake, consistent growth, and consistent gains on these cattle, it's an easy, low-cost win for feedlots.”

The first part of Seidle's project is a metabolism study, looking to see if overprocessing barley and adding water reduces sorting behaviour, and how this impacts or changes digestion. For this, Seidle had to record feed and water intake,

collect rumen fluid and fecal samples, and measure rumen fill from eight cannulated steers at the Livestock Research Building on campus.

Seidle's second study is a larger feedlot study involving 120 steers at Agriculture and Agri-Food Canada's Lacombe Research and Development Centre in Alberta. There, she is examining animal growth and carcass characteristics such as muscle mass and fat deposition—in other words, how adding water to rations impacts the quality of meat being produced.

The idea to add water seems to have come naturally to Seidle, given her background in Saskatchewan agriculture. She grew up on her family's mixed farm near Colonsay, Sask., which includes a sizable cow calf and grain production





Catherine Seidle

Photography by Ian Goodwillie

operation. In 2017, she earned her bachelor's degree in agriculture with a major in animal science at USask. She then worked at Blair's Family of Companies, which provides farm and ranch services and supplies. Seidle then joined the Saskatchewan Ministry of Agriculture as a Livestock and Feed Extension Specialist. She is now on a two-year leave to complete her master's.

At the ministry, Seidle fielded a lot of questions from producers regarding the maximum amount of grain they could feed an animal, as well as how to encourage feed intake so animals gain weight and muscle faster. "All of these concepts are wrapped into this project," said Seidle.

The practice of adding water to rations

is not new in other livestock sectors. "Dairy operations do this all the time to reduce sorting," noted Seidle. "And cow-calf producers will do this too on high-forage diets that are dry. They add water to reduce dust, but (adding water) rarely ever happens in feedlots on high-concentrate diets."

However, sorting is a problem in feedlots too, because of the very dry diets provided, and the variable kernel size of barley, which results from both overprocessed and under-processed kernels. Without processing, cattle can't get the full nutritional value of whole barley. They are unable to break the hard outer coating of the kernels with their teeth, which therefore inhibits the

microbes in their rumen (first stomach) from digesting the kernels. The barley must be broken for them.

In Saskatchewan, this is typically done by dry rolling the grain, where the kernels are squeezed between two rollers in a mill.

Dry rolling has its own challenges. Getting consistently uniform kernel size for rolling is practically impossible. As Seidle explains, in Saskatchewan hundreds of loads of barley arrive at elevators each week. Different varieties grown under different conditions and agronomic practices all get blended together. Therefore, when the kernels go through the roller mill, the smaller kernels pass through rollers unbroken. Larger kernels shatter, producing fine particles.

The underprocessed kernels pass through the animal undigested, so the starch ends up in the cattle's manure "and that's just costly nutrient loss," said Seidle. Fine particles due to overprocessing are digested too quickly, causing rapid acid production (acidosis), reducing the rumen's pH and killing off its microbes. Then the cattle "tend to stop eating because their stomach hurts."

So why is sorting undesirable? Producers want their animals to take in a consistent mix with each mouthful, and sorting prevents this from occurring. Otherwise, they may eat all the roughage first, then eat barley for the rest of the day, moving to smaller and smaller kernels, and finally just fine particles which can cause digestive upset.

In feedlot pens, the dominant animals will eat mostly forage immediately, leaving less-dominant animals with a higher barley (and therefore lower forage) diet, potentially causing digestive upset. Adding water to rations creates a stickier mix that could reduce sorting. This in turn could lead to a more stable rumen environment, more predictable fermentation, consistent intake and consistent—or perhaps increased—daily gain.

Seidle doesn't expect her project will be the final word on the subject, but "it is awesome to know that at the end of this ... the concept of this could easily be extrapolated (in further research)."

Meanwhile, she hopes adding water to rations is "something feedlots could adopt in the next couple of years and help with animal health." ♥

# Cultivating a rewarding career that started at USask

 JANE CAUFIELD

Kaitlin Kelly's childhood memories are full of spending days on the family farm near Assiniboia, Sask., and growing up surrounded by agriculture in and around her hometown of Swift Current, Sask. And it's a big reason why she is drawn to the profession of agricultural economics.

"Growing up in Swift Current, agriculture was a pretty strong driving force in the local economy, and many of my friends also came from family farm backgrounds," said Kelly. "So, I grew up with an understanding of how important agriculture is to the local economy and social fabric of rural Saskatchewan."

Kelly first graduated with a Bachelor of Science in Renewable Resource Management from the University of Saskatchewan (USask) in 2014 and in 2016 she graduated with a Master of Science in Agricultural Economics. Her thesis project looked at ways to balance economic and environmental benefits in agriculture.

"Most people who go into Renewable Resource Management choose the Resource Science major because there is a field school component in the second year where you get to do a lot of land-based learning. To be honest, I chose the Resource Economics and Policy major purely to avoid having to camp in October during the field school component," said Kelly. "But that decision was one of the best I've ever made as it allowed me to discover my love for economics, and in particular resource and agricultural economics."

Kelly now works as an economist with Agriculture and Agri-Food Canada (AAFC) where she can combine her knowledge and interests in ways that supports the industry she is passionate about.

## **Agricultural economics is more than just numbers**

When reflecting on her research as a master's student, Kelly is quick to highlight how important economic considerations





**Alumna Kaitlin Kelly (BScRRM'14, MSc'16) says majoring in Resource Economics and Policy was one of the best decisions she's made.**

Kaitlin Kelly

Photography by Wilna Furstenberg

are to the sustainability of farming in Saskatchewan.

"During my time at USask, I was working at the intersection of agricultural economics and environmental policy," said Kelly. "I think research in this area has always been important but is becoming more important and gaining more recognition as all levels of government and industry are increasingly focused on sustainability in the agriculture sector, regenerative agriculture, and how agriculture can be part of the solution in terms of reducing GHG emissions and providing carbon sink capacity."

Kelly said that providing the economic insight relative to sustainable agricultural practices and approaches gives producers the tools to make informed decisions about the future of their work.

"There is also a lot of interest from consumers in how their food is grown and produced. We've learned that sustainability and traceability attributes are increasingly important to consumers," said Kelly. "So, this type of research on balancing economic and environmental costs and benefits in agriculture is still very important to help equip producers with the information they need to make decisions for their farm to help them meet the demand for sustainably produced food."

### **A meaningful career of making projections**

Working for Agriculture and Agri-Food Canada as an economist means looking at the data to uncover useful patterns and interpret market signals for key agricultural commodities, to produce reports and analyses that help to inform government decision making.

"I work with a team that provides projections for the agriculture sector, covering supply and disposition for the major crop and livestock sectors in Canada," said Kelly. "We estimate changes in key economic indicators under different future scenarios in order to provide information to policymakers within the federal government."

"Working to advance economic prosperity and stability for agricultural producers is something I find very rewarding," said Kelly.

Kaitlin said that she was well prepared to approach her work with confidence because of the world-class education she

received at USask.

"USask is recognized as one of a handful of universities in Canada that produce top-quality, specialized agricultural economists and I have found that our graduates are highly sought after," she said. "The Department of Agricultural and Resource Economics is home to many well-known and highly respected professors in that field that have strong connections both with industry and government. Those connections help introduce students into industry and government circles and can lead to career opportunities once you graduate."

Kelly credits her thesis supervisor Dr. Ken Belcher's (PhD) research partnership with AAFC during her graduate work for introducing her to her first job with the federal department.

"I had two co-supervisors for my thesis research—Dr. Ken Belcher from the Department of Agricultural and Resource Economics and Dr. Mohammad Khakbazan (PhD) from AAFC— which helped me to transition from the world of academic research to career opportunities with the federal government after graduation."

She also points out that the college has developed many important partnerships with organizations and associations that ultimately provide unique benefits to students. One example she highlights is a relationship between the College of Agriculture and Bioresources and the Saskatchewan Institute of Agrologists (SIA).

"It allows graduates to qualify for and pursue a Professional Agrologist designation. This is a major asset when applying for jobs in the agricultural sector," said Kelly. "Now that I am working in this sector, I am proud to be a Professional Agrologist and member of the SIA."

And while the benefits of being a USask grad continue to help Kaitlin grow her career, she said one of the most rewarding parts is knowing she still gets to keep agriculture in the family somehow.

"I am very proud of my degrees from the University of Saskatchewan College of AgBio and proud to use those degrees to serve the agriculture industry in Saskatchewan and Canada as a public servant for AAFC," said Kelly. "I feel as though my grandparents who farmed near Assiniboia all their lives would be proud of me, too." 🍷

# A legacy that will live on for generations

**A land donation from Joan Snyder leads to new opportunities for AgBio.**

 JANE CAUFIELD



Joan Snyder  
*Photo submitted*

The idea of a legacy can mean different things for different people. Some will think of it as a donation of some kind, while others will think about it in terms of doing something or leaving something that has a lasting impact. For the College of Agriculture and Bioresources at the University of Saskatchewan (USask), a bequest of 2,240 acres of land just outside of Eatonia from Calgary philanthropist Joan Snyder (C.M., LL.D) is the kind of legacy that will enhance agricultural education for years to come.

### **A humble business leader with a long history of generosity**

Snyder was born on February 20, 1932, in Kindersley and grew up in Eatonia. While the economic realities of the 1930s led to devastating hardships for families across the country, many who knew Snyder talk about how she learned the value of kindness and community from watching her parents work hard to persevere. That hard work eventually paid off and her father, Calvin, became one of the largest individual holders of mineral rights in Western Canada.

“They moved to Saskatoon and then in the early 1950s, they moved to Calgary, where Calvin continued his work in business. He died in 1961 and Joan and her mother, Phoebe, took over managing the family businesses, continuing to build value,” said Don Brownie, a business colleague and close friend of Joan’s.

After her mother passed away in 1991, Joan continued to manage the family businesses that included real estate, oil and gas holdings, and farming operations in both Saskatchewan and Alberta.

Brownie is quick to highlight Snyder’s caring nature and her keen interest in supporting the communities that she lived and worked in.

“While Joan was an accomplished businesswoman, she was always best known for her overwhelming generosity and her intense concern for the wellbeing of others,” said Brownie. “She was a huge supporter of women’s hockey. She made a generous and substantial contribution to the Dinos women’s hockey team at the University of Calgary, helping them win the national championship in 2012. She also generously supported USask Huskies women’s hockey through a scholarship in memory of her mother.”

In 2000 she financed the creation of the Snyder Chair in Critical Care Research at the University of Calgary and a few years later she helped to fund the creation of the Snyder Institute for Chronic Diseases. She had a long history of supporting organizations that mattered to her including the Salvation Army, the Society for the Prevention of Cruelty to Animals, Agape Hospice, the Glenbow, Fort Calgary, the Calgary Zoo, Heritage Park, Meals on Wheels, Wood’s Homes, and Mount Royal University. In 2011, she made a significant contribution to WinSport Canada in support of women’s hockey development at the local, national, and international levels. Through all of that, she continued to support the University of Saskatchewan.

“Joan and former USask President Peter MacKinnon developed a strong friendship,” said Brownie. “Although Joan was a proud Albertan, she was also proud of her Saskatchewan roots and the solid values the province represents.”

In 2011, the University of Calgary recognized Snyder’s history of generosity and awarded her an honorary Doctor of Laws degree. In 2013, she was recognized on a national level for her philanthropy and was honoured with the Member of the Order of Canada.

Snyder passed away on April 7, 2022, at 90 years of age.

### **A growing land base nurtures the college’s future**

While the college’s full plan for the donated land will take time to develop, it is recognized as a transformative gift.

“We are immensely grateful for Joan Snyder’s donation and plan to honour her memory by being the best custodians of this land that we can be,” said Dr. Angela Bedard-Haughn (PhD), dean of the College of Agriculture and Bioresources.

USask currently owns more than 14,000 acres of land across the province, of which a significant portion contributes to AgBio’s mission. This most recent addition has significantly grown the college’s capacity as a leader in agricultural education and research.

“Joan’s forethought and commitment to her Saskatchewan roots will provide new research and teaching opportunities, including new opportunities to study crop varieties and agronomic practices of relevance to the more arid parts of the Prairies. In turn, this will ensure a more resilient agriculture sector and a better learning experience for our students who are the future leaders of the sector,” said Bedard-Haughn. ♥

**“Joan’s forethought and commitment to her Saskatchewan roots will provide new research and teaching opportunities, including new opportunities to study crop varieties and agronomic practices of relevance to the more arid parts of the Prairies.”**

DEAN ANGELA BEDARD-HAUGHN, COLLEGE OF AGBIO

**The Saskatchewan Agriculture Graduates Association (SAGA) proudly represents the interests and accomplishments of graduates from the college and school.**



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## Honorary life members for 2023

**Dr. Brian Fowler '64 C** was raised on a farm near Clair, Sask. He used his participation in 4-H as a springboard to his University of Saskatchewan (USask) education. He earned his BSA with Great Distinction, completed his MSc at USask, then obtained his PhD at the University of Manitoba. As a professor in the Department of Plant Sciences, and one of the first scientists at the Crop Development Centre, Brian spent his career improving winter wheat production, resulting in 18 varieties adapted for the Canadian Prairies. Brian has had a long and significant impact in Saskatchewan, Canadian, and global agriculture with his research concentrated on winter wheat and conservation production systems. His work has been acknowledged, being named a Fellow of the Canadian Society of Agronomy, the American Society of Agronomy, and by his induction into the Saskatchewan Agricultural Hall of Fame in 2018.

**Murad Al-Katib** is the president, CEO and a board member of AGT Food and Ingredients Inc. A strategic business and financial thinker, Murad founded AGT Foods in 2001, building a Canadian startup into a global multi-billion-dollar value-added pulses, staple foods, and ingredient company. His career began in public service with the Government of Canada and then as a founding director of the Saskatchewan Government's international trade and export development agency, the Saskatchewan Trade and Export Partnership (STEP). Murad is a passionate advocate of Canadian agriculture, speaking extensively on the opportunities and challenges facing Canada's agriculture sector. Murad has received several prestigious awards including 2020 Globe and Mail "Innovator CEO of the Year".

## 2023 highlights

John Hauer '84 C is our 2023 SAGA President, and Henry de Gooijer '83 C is our vice-president.

Kayley Harvey '23 was the recipient of the 2022-23 SAGA Undergraduate Scholarship.

There are some great stories in the June 2023 issue of The SAGA. Ken Wasylsynshen

'70 C outlines a typical year for him above the Arctic Circle, plus articles by regular contributors Irene Ahner '65 C and Al Hingston '69 C. All those and more are available at [saskaggrads.com](http://saskaggrads.com).

Harold Chapman '43 C celebrated his 106th birthday and Ozzie Lakness '49 C his 100th this past spring.

College of AgBio grads Laurie Tollefson '75C & '85 MSc, Kevin Hursh '80 C, and John McKinnon '86 MSc & '93 PhD were inducted to the 2023 Saskatchewan Agriculture Hall of Fame (SAHF) in recognition of their contributions to the agriculture industry. As well, former SAGA Presidents Jim Bessel '88 S and Jeff Schoenau '84 C & '88 PhD were inducted into the 2022 SAHF.

## 2023 reunion

SAGA enjoyed a very successful return to our annual reunion banquet after a two-year hiatus.

A record number of graduates attended the Friday Night Social, hosted by the College of AgBio and SAGA Executive. Various tours were offered, led by Bryan Harvey '60 C, Hamish Tulloch '91 C, Adam Harrison (phytotron manager) and Eric Johnson '82 C.

We enjoyed a much higher than expected turnout for the banquet/mixer. 2022 SAGA President Deanne Belisle '79 C welcomed over 300 grads and guests. Everyone was excited to see their classmates in this special setting once again, and enjoyed the delicious meal provided by the TCU Place chefs. Several of the classes that had to forego the cancelled reunions made up for it this year.

We also witnessed the return of our SAGA Hockey Tournament, held once again in Waldheim, Sask. One of many highlights was the participation of the 1993 C team. Thirty years after their best before date, they won the B side.

## Call for volunteers

SAGA has been run by a revolving group of dedicated Ag grad volunteers since its founding in 1935. Each year we need new volunteers to be chairpersons to organize their classmates for our annual reunion. We continually require new volunteers for the SAGA Executive. A mix of new and

old grads on the executive works well, balancing fresh ideas with experience. If you are interested, please reach out. We are looking for Ag grads to organize the banquet, take on membership, and for next year's vice-presidency.

SAGA recognizes and invites ALL degree, diploma and certificate graduates of the College of AgBio to join our alumni association. Please visit [saskaggrads.com](http://saskaggrads.com) for more information.

## Stay in touch

SAGA has made a few changes to how we send our newsletter electronically. If you have stopped receiving the bi-annual newsletter, please get in touch with us.

We have updated our contact information for members to better reach the SAGA Executive:

General inquiries - [contact@saskaggrads.com](mailto:contact@saskaggrads.com)

SAGA reunion and chairpersons - [reunion@saskaggrads.com](mailto:reunion@saskaggrads.com)

SAGA treasurer - [treasurer@saskaggrads.com](mailto:treasurer@saskaggrads.com)

SAGA membership - [memberships@saskaggrads.com](mailto:memberships@saskaggrads.com)

Submit news to The SAGA editors - [newsletter@saskaggrads.com](mailto:newsletter@saskaggrads.com)

*Please note [thesaga@sasktel.net](mailto:thesaga@sasktel.net) has been discontinued.*

## 89th SAGA Reunion Weekend: January 5 and 6, 2024

**Jan. 5 4 – 7 pm**

Friday Night Social: Ag Building Atrium  
Guided tours: Gabfest in ASA Lounge

**Jan. 6 7 am – 5:30 pm**

SAGA Hockey Tournament in Waldheim, SK

**Jan. 6 4 – 9 pm**

Banquet – TCU Place, Centennial Halls (Basement)

**Jan. 6 9 pm – 1 am**

Mixer – TCU Place

Recognition of Years: 1944, 1949, 1954, 1959, 1964, 1969, 1974, 1984, 1994, 2004, 2014, 2019



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