



Bioscience in Saskatchewan: **The last 30 years and
Emerging Technologies**

Ag-West Bio Annual Report 2018-19



Serving Saskatchewan
for 30 years

President's Message

Ag-West Bio and AgFood Science in 2050



As we review the last 30 years regarding the advances in agfood bioscience and innovation, it is equally important to look forward to the next 30. If society embraces a scientific approach to sustainability, product development, waste reduction and human nutrition and health, the future of the agfood industry will be bright.



The rapid development of genomics will result in exceptional advances in crop and livestock improvement.



In food production, processing, transportation and utilization systems, the application of digital and artificial intelligence (AI) technologies is rapidly growing. Citizens of 2050 will have access to highly reliable systems of verification, traceability, safety and logistics—with smart decision making throughout the value chain. Quantum computing and AI will facilitate rapid and accurate interpretation of the data, while advances in automation will drastically alter the workforce.

The rapid pace of development in the field of genomics—including the availability of genome editing tools—will result in exceptional advances in crop and livestock improvement. By 2050 it will be feasible to enhance photosynthetic efficiency of crops, and to enhance carbon sequestration both above and below ground. Plant breeders will be able to effectively select for traits such as water and nutrient use efficiencies. By 2050 we can also foresee the development of crops with altered root systems and positive effects on soil health and crop performance.

We often hear comments regarding the need to increase food production by 70 per cent by 2050 to feed the growing population. However, nearly 50 per cent of global production capacity is currently wasted or lost. This fact presents both a challenge and opportunity. New, creative strategies are being developed, including using food waste to cultivate protein-rich insects.

Future research will address the subject of nutrition and health beyond the role of macronutrients (protein, fats and carbohydrates). We see rapidly growing interest in micro-constituents, such as cannabidiols (CBDs), and their potential impact on health. By 2050 we can anticipate a large range of specialty molecules that will play a role in health improvement. Consumer desire for diverse, quality food products will lead to the cultivation of a wider variety of crops. There may even be public acceptance of GMOs as consumer benefits become readily apparent!

Ag-West Bio will continue to have a major role as a catalyst over the next 30 years. As we consider the need to integrate new technologies, along with social and consumer impact and long-term economic growth, a solid case can be made for sustained support for Ag-West Bio! The long-standing, positive relationship that we have with the Saskatchewan Ministry of Agriculture and Agriculture and Agri-Food Canada is gratefully acknowledged. An emphatic thank you (!) is also extended to Ag-West Bio board and staff for their exceptional commitment.

A handwritten signature in blue ink, which appears to read 'Wilf Keller'.

Wilf Keller



Letter from the Chair



The past year was an extraordinary one at Ag-West Bio Inc.

The Protein Industries Canada (PIC) super-cluster launched officially this spring. Ag-West Bio was instrumental in engaging the community in development of the letter of intent and the application, and will provide support to PIC in delivering its programs in Saskatchewan.

Ag-West also played an essential role in organizing the recent PIC-sponsored 12th Plant Protein Ingredients Summit and associated innovation tour.

Ag-West Bio spearheaded the establishment of the Diverse Field Crops Cluster (DFCC), one of 19 agri-science clusters approved for funding by Agriculture and Agri-Food Canada. Ag-West also has assumed administrative responsibility for DFCC over its five-year lifetime.

Ag-West was instrumental in creating the Prairie Plant Protein Coalition (P3C), a consortium comprising the Plant Protein Alliance of Alberta, Bioscience Association Manitoba and Ag-West Bio. P3C members will work together in showcasing the potential for value-added agriculture in Western Canada and in delivering programs for the PIC supercluster.

And then there is the pending retirement of our President and CEO.

This has sparked a flurry of activity related to succession planning, stakeholder consultations and a formal search for his successor.

I've listed these items for two reasons. First, to highlight the outstanding and, at all times, professional effort expended by Ag-West Bio management and staff. This small group of dedicated individuals consistently "punches above its weight," yet still finds time and energy to take on major new initiatives.

The group is also committed to making the transition to new leadership as smooth and seamless as it can be. For that, I say "thank you" on behalf of the board of directors and all stakeholders of Ag-West Bio.

Second, to emphasize the continued relevance of Ag-West Bio after 30 years. Ag-West continues to engage and educate the community, to bring people together, to promote new ideas and initiatives, to interpret science for the general public, to aid the development of fledgling companies. These roles are as vital today as they were in 1989, if not more so.

I'll close by thanking the members of the board of directors for their efforts. I look forward to an exciting year ahead as your chair.

Robert (Bob) Tyler

Vision: Saskatchewan's catalyst for leading Canada's foremost bioeconomy.

Mission: Accelerating innovation and enabling companies to commercialize research.

Mandate: To provide leadership, as a catalyst, to link existing capabilities and resources in order to strengthen the bioeconomy industry in Saskatchewan.

Ag-West Bio Board of Directors

Robert (Bob) Tyler (Chair) - University of Saskatchewan

Tim Herrod (Vice-Chair) - Consultant

Karen Churchill - Cereals Canada

Laurie Dmytryshyn - PIC Investment Group Inc.

Shawn Gibson - Saskatchewan Ministry of Agriculture

Rick Green - KeyLeaf

Danya Kordan - Innovation Saskatchewan

Kendra Mueller - Farm Credit Canada

Leah Olson-Friesen - SeedMaster / Dot Technology Corp.

Kate Sanford Mitchell - UPL Ltd

Steven Webb - Corteva Agriscience

Lee Whittington - Four Oaks Investments, and Coaching Excellence Organization

Ag-West Bio Staff

Wilf Keller - President and CEO

Brad Bly - Director of Commercialization

Mike Cey - Director of Corporate Initiatives

Boni Dorish - Chief Financial Officer

Lana Mollard - Corporate Secretary and Executive Assistant to the President & CEO

Patrick Pitka - Special Advisor - Corporate Strategy

Jackie Robin - Director of Communications

Allison Sigstad-Kirzinger - Events Coordinator

Bev Stangeland - Manager of Industry Development

Betty Timmons - Administrative Assistant

Pamela Warren - Administrative Assistant

Industry Overview

Ag-West Bio: 30 years of Leadership and vision, strategy and evolution

Ag-West Bio turned 30 on April 1, 2019. The organization has enjoyed consistent funding from the Government of Saskatchewan since the beginning, which has allowed it to evolve along with the expansion of the bioscience industry and stay relevant to its stakeholders.

The Ag-West Bio model is one that several other provinces emulate. A number of founding members, along with the current president and CEO, took time to reflect on and celebrate Ag-West Bio's impact on the bioscience industry in Saskatchewan, and to share their thoughts on what the future may hold.

A unique and empowering funding model

Ag-West Bio President and CEO Wilf Keller says the organization is built on a unique funding model. "Most of our funding is operational and comes from government. It is long-term, significant funding, where many other organizations depend on membership fees and funding on a project basis."

Grant Devine was Saskatchewan's premier when the company, then named Ag-West Biotech, was created. He remembers the government's reasons for committing to the first five years of funding in 1989: "We originally had three reasons to fund Ag-West: we knew the University of Saskatchewan had a solid reputation in genetics and the ag-food world. We thought if we could capitalize on that and tie in a number of people and companies bringing new ideas to ag genetics, we could make two and two be five."

The provincial government saw the value of leveraging a three-way partnership with industry and the University's research

capabilities. That, along with the potential for Ag-West Bio to be a reliable source of information to educate the public, made it a valuable investment.

A visionary concept

Former board chair Pete Desai remembers: "The original concept was visionary. It was the first organization of its kind supported by the provincial government. That wasn't—and still isn't—common. An arm's length organization with original funding with a four- or five-year sunset clause. Now, 30 years later, it's still supported by the same entity."

"In the early stages, the leadership could see the potential of a technology in its infancy. Murray McLaughlin, first president and CEO, started with an attitude of 'why not?' Leadership and vision were the things that created Ag-West as a success story and they stuck to it."

Murray McLaughlin says he was brought to Saskatoon to build a cluster around biotechnology and genetic engineering (also called genetic modification or GM). "We went from three companies to 40 companies in six years," he recalls. "Big companies like the Royal Bank and Ernst & Young hired accountants and lenders to specialize in biotech. Saskatoon was ahead of the game from a business perspective, with a commitment to supporting start-up companies and attracting business." Ag-West Bio became an early leader in ag biotech in Canada.

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Emerging Technologies

Three streams that are revolutionizing agriculture

From a bird's eye view to the invisible world beneath our feet, to the 'minds' of robots and autonomous machinery, the scope and appearance of agriculture is changing.

"The quickly growing areas of digital, AI and big data is *big*," says Wilf Keller. "We can make smarter decisions along the entire value chain, from the field to a

food product's destination. The future will see an integration of the three key pillars of agricultural engineering, genetic technology and digital technology."

"Looking ahead, Ag-West Bio needs to keep an eye on where the puck is going, not where it is right now. Integration will require a lot of cooperation—and cooperation is in our blood."



Smart Ag

"Agriculture has always been smart, but now it is becoming digital," says David Yee, VP of Saskatchewan Operations at PAMI. "We're excited about the trends that are coming in and how this will change sustainability from an environmental, economic and social standpoint. Farming will always be a human endeavour, and automation will support the stewards of our land in that endeavour."

"We see a transition happening, with many changes to conventional farming that will create an entire ecosystem of agriculture, using integrated data to predict pest and weed trends, as an example. Farming machinery will get smaller, farming will become more efficient. Inputs will become significantly lower, because we will be that much more precise. We're definitely on the path of continuous improvement."



Drones

Using unmanned aerial vehicles (UAVs) or drones, researchers are identifying traits related to yield in canola, lentils and wheat. "If we fly regularly enough, we can quantify the length and intensity of flowering, canopy volume and even count the number of seedheads in a given area," says Steve Shirliffe, Crop Phenometrics Platform Project Co-Lead at the U of S Plant Phenotyping and Imaging Research Centre. "We can also identify changes in soil quality over a field. Changes in soil colour is often correlated to levels of soil organic matter, for example."

The next step is to determine how these new phenotypes are heritable and can be used in breeding programs. "We're still in the first stages of figuring this out. It's a really interesting research discipline to be involved in— it's brand new. There's a lot of excitement in the area right now."

Autonomous Implements

The first leg of the race to autonomous agriculture has been won by Dot, an ag-tech company in Emerald Park, SK.

Dot's U-shaped power platform connects to any implement that has been built to be compatible with Dot and completes its mission by following a path that has been determined through field mapping. This spring, a limited release of Dot units were sold to farmers—demonstrating the success of the past three years spent testing and developing the autonomous functions of the unit.

"It's exciting that the first autonomous implements are coming out of Saskatchewan," says Dot CEO Leah Olson-Friesen. "We are proud of the partnerships we're building and look forward to working together with a variety of implement manufacturers to enable farmers to spend more of their time focusing on the overall operation of their farms."



Continued on page 7

Right: Ag-West Bio staff and board were joined by guests for networking, including The Honourable David Marit, Saskatchewan Minister of Agriculture.

Evolving with the industry

While Ag-West Bio was supporting start-ups and building a network of researchers and industry partners, it also worked with government to develop a regulatory framework for genetically engineered crops as part of its early focus on GM, soil biologicals and livestock genetics. An era of commodity surpluses and low prices followed, and the focus shifted toward non-food bioproducts and biofuels. That has since given way again to food as a focus: from genetic research to protein and byproducts, and value-added products.

An important development in Ag-West Bio's business structure happened in 2004 when Saskatchewan Bioproducts and Saskatchewan Nutraceutical Network (SNN) were folded in, and the name was changed to Ag-West Bio. Carol Ann Patterson, who became Vice President of Nutraceuticals at that time, says "Saskatchewan Nutraceutical Network didn't want to lose the industry membership that it had developed, so that was a requirement of collaborating with Ag-West Bio. As a result, Ag-West has retained a membership which represents the breadth of the industry. Ag-West consults with, and is accountable to, its members. It's important for an organization to have that accountability." Patterson notes the current



trends returning to a health and food focus.

Keller believes this evolution, in lockstep with the wider trends, has been critical to the company's success. "Ag-West has evolved with continuous emergence of new technologies and the associated increased knowledge base, from GM to bioproducts to genomics to digital ag and big data. We are reacting to the changes and connecting to new companies all the time. We continue to have community support because we have stayed current."

Industry integration

"Integration of all three industries—bioproducts, genomics research and functional foods—is so important. There is a lot of crossover and byproducts from one that can serve as ingredients for another," says Patterson.

McLaughlin is excited about the current focus on multiple industries making use of a whole crop. "It was an exciting time in the 90s, but it's even more exciting now with recent advances. We're turning starch coproducts from plant-based protein production into biofuels and biodegradable

packaging, all made from the same plant. It's the same with forest products. We're asking 'what can we do with wood besides paper?' That is the future."

Networking: a surprising benefit

"An important element of success for Ag-West is its networking ability," says Devine. "They have a library of people who are doing similar research, willing to invest and make connections. I didn't expect that outcome, but it's a huge, worldwide network, which is phenomenal for the three sectors. It was a pleasant surprise, and very valuable."

As project manager for a new crop cluster led by Ag-West Bio named the Diverse Field Crops Cluster (DFCC), Patterson has direct and current experience with Ag-West Bio's ability to network and build on collaboration. "Ag-West leads and creates momentum. The team comes up with the ideas and gets the right people together to collaborate. DFCC supports research and development of seven emerging crops: flax, camelina, canaryseed, sunflower, hemp, quinoa and mustard. Ag-West

coordinated the effort to get the seven crop groups together—including producers and private industry—to apply for federal funding through the Canadian Agricultural Partnership (CAP)." The new cluster has been approved for 15 projects, totaling \$24 million between government and industry.

A strategic approach to the future

As Wilf Keller approaches the end of his tenure at Ag-West Bio, he reflects on the efforts over the last nine years, working strategically to identify gaps and develop a pan-prairie approach to agricultural innovation. This work included the development of collaborative events such as Breadbasket 2.0 in 2013, as well as the creation of the Protein Industries Canada (PIC) supercluster.

Pete Desai believes "the future for the organization, besides what it does so well, is to challenge itself to take leadership and expand its strategic vision by aligning similar organizations across Canada. This alignment would create a strong group to advocate for agriculture as part of the solution to a healthy Canada—for humans, animals and the environment."

As innovation happens at an even faster pace, one thing is certain: Ag-West Bio will continue to adapt and evolve, as will the networking, collaboration and industry support that has become synonymous with the company. McLaughlin sums it up: "People think a cluster develops because of the science, but the cluster really develops because of the people: organizations agreeing to get on the same train." ■

Soil Science



Complex interactions between soil infrastructure, the soil microbiome and root systems were once unknown, or merely guessed at. With advances in in situ root imaging, understanding the function of root architecture and the mechanics of nutrient uptake, and DNA profiling of the soil microbiome, researchers will soon meet the goal of identifying and incorporating competitive root traits into plant breeding programs.

It will take a new level of collaboration across many disciplines to do it, says Leon Kochian, Associate Director of the Global Institute for Food Security. “Agriculture is becoming a big science—it is truly interdisciplinary across biological, physical and mathematical sciences,” he says. “The team we’re building includes computer scientists, computational biologists, x-ray physicists, soil microbiologists, and engineers who can build phenotyping systems using sensors and imaging.”

Intercropping

Planting multiple crops in the same field takes more research and planning, and challenges the abilities of some conventional machinery. The right combination, however, reduces insect pressures, competes more strongly with weeds, requires fewer inputs and produces higher yields. “When people ask why I intercrop,” says Colin Rosengren of Three Farmers, “I ask them, why doesn’t everyone intercrop?”

There are some natural planting combinations whose yields speak for themselves. “Flax and chickpea is a no-brainer,” says Rosengren. “In the next five years you won’t see anyone mono-cropping chickpeas. Flax really reduces the disease pressure.” Rosengren is also mixing precision agriculture with intercropping, planting peas in lower, wetter regions and lentils in higher, drier regions, with canola throughout. While a mix of two crops increases yield by 30 per cent, the three-crop mix has shown a 50 per cent higher yield.



Genetic Technology



CRISPR-based gene editing is revolutionizing genetic technology by simplifying the process. “With CRISPR you can prescribe a mutation in a particular gene of interest and reduce the background noise inherent in classic mutagenesis. It allows you to make precise changes at prescribed places in the genome with predictable effect,” says Kevin Rozwadowski, an Agriculture and Agri-Food Canada research scientist.

CRISPR offers several exciting possibilities in the health field as both a discovery tool and in clinical applications. While agricultural research will be able to piggyback off medical discoveries, there are also promising ag-specific applications already underway. “All major crops will benefit from this technology by speeding development of certain traits related to disease resistance, drought tolerance, seed quality, flavour profiles and more. From crops to livestock to clinical applications in humans, the next handful of years is going to see dramatic results from this technology,” says Rozwadowski.

Food Technologies



Shannon Hood-Niefer, VP Innovation and Technology at the Saskatchewan Food Industry Development Centre says, “The biggest trend in health and wellness right now includes a perception that plant-based foods are healthier, safer and environmentally sustainable.” Food production technology is evolving and expanding choices for consumers through natural modifications such as fermentation and hydrothermal treatments that affect flavour and texture and expand possibilities for ingredients and food products.

“As our population expands, we’re going to see more focus on functional foods and ensuring we maintain bioactive ingredients through the manufacture of food. We need to know when, where and how to work with active ingredients.” Hood-Niefer believes Saskatchewan has great depth and breadth of skills in terms of value-added agriculture and processing. “It’s time for us to really step up and promote what we can do—we’re more than just primary production.”

Commercialization Report

The 4th Agricultural Revolution Going digital is taking off

By Brad Bly

Director of
Commercialization



It's an exciting time to be in Ag-tech! At an unprecedented pace, new industry is being formed around innovative digital technology solutions and existing biotechnology, and food firms are adopting new digital tools. We are also seeing exceptional development of novel food and feed products, founded on innovation, health and environmental sustainability.

In 2018 ag-tech was a leader in global investment activity in number of deals—higher than 2017 and 2016 numbers. Within the ag-tech category, biotechnology is still achieving the highest investment dollars; however, the burgeoning 'farm management software / sensing / Internet of Things (IoT)' segment is outpacing all other categories.

With the advent of the 'fourth agricultural revolution' (the digital revolution) taking shape, Ag-West Bio included digital opportunities in our 2018-2023 Strategic Plan. This year we began to execute this strategy, while striving to stay nimble enough to adapt to new opportunities as they arise.

In 2018-2019, we worked with more than 50 Saskatchewan companies, many of them start-ups on the cutting edge of the revolution. We assist in many ways, often working closely to help them overcome commercialization hurdles and seize specific opportunities. We offer services centered on three themes: provision of information and resources; building networks and advisory

capacity; and advancing public funding and private investment readiness.

We devised and hosted eight industry workshops to provide information on what resources are available to help with commercialization. We highlighted new opportunities with public organizations like Sustainable Development Technology Canada, Innovation, Science and Economic Development Canada, and Western Economic Diversification Canada, and we provided tailored input to help companies obtain these and other resources. We also showcased four innovative start-up companies, inviting potential collaborators and partners to learn about their new technologies, which we consider to be at the cutting edge of digital, IoT and food innovation.

Our collaboration continues with the Raj Manek Mentorship program, as well as other local partners, to link companies with mentors. We also proactively seek international mentoring and acceleration opportunities to help start-ups build networks and advisory boards and meet potential investors. We produced more than 20 new partner linkages for Saskatchewan companies. Also this past year we increased our partnership with key global ag-tech accelerators—prestigious vehicles with a tremendous waiting list of applicants. We are pleased to say we helped Saskatchewan companies gain meetings, recognition and success with these vehicles.

In addition, we targeted key international conferences and created programs to help



companies attend. We developed a strong presence at these conferences, setting up meetings and workshops to encourage new partnerships. Ag-West Bio, along with our partners, helped 10 Saskatchewan companies participate in global events last year.

Investment readiness is a key activity that complements all our services. Ag-West Bio provides advice and pathfinding to help companies build their business plans and address any gaps, preparing them to obtain financial capital and market partnerships. Where appropriate, we invest directly through Ag-West Bio's Technology Commercialization Fund. Since Ag-West's inception in 1989 it has made or managed 70 investments in 61 different companies, totaling over \$13.3 million dollars. These investments have been long-term in nature, devised to help promising technology companies meet key milestones. When leveraged (on average 4X with additional capital sources) these have resulted in impressive outcomes, including job creation, revenue and other successes.

This past year Ag-West Bio advanced \$115 thousand investment capital to two companies; investment term sheets totaling \$550 thousand to two companies; and substantial investment restructuring leadership to two others. This combined activity helped these companies leverage more than \$4 million in additional private and public capital, accelerating them toward their commercialization goals, while putting Saskatchewan on the global map as a growing ag-tech innovation leader. ■

Growing through Partnerships



By Mike Cey

Director of
Corporate Initiatives

Ag-West Bio seeks and seizes opportunities and builds partnerships. The efforts of many continue to bear fruit for the Saskatchewan bioeconomy. The following are a few highlights from the past year.

Diversifying crops

February saw the launch of the Diverse Field Crops Cluster (DFCC). Led and administered by Ag-West Bio, this agri-science cluster was awarded \$13.7 million from Agriculture and Agri-Food Canada's Canadian Agricultural Partnership (CAP) program over five years, with an additional \$11 million coming from industry. DFCC will help transform the footprint of seven high-potential emerging crops to larger acreage and higher economic value. Diversifying the cropping mix will help extend rotations, break disease and pest cycles, and insulate producers from the volatility of commodity prices. Carol Ann Patterson has been retained as program manager and is overseeing the 15 research projects now underway. The focus is on germplasm development, crop protection, agronomy and value-added processing.

Northern connections

A partnership between Ag-West Bio and the Keewatin Community Development Association of La Ronge has led to discussions, with the aim of launching a wild rice improvement project. By building relationships and assessing opportunities, several key areas of research have been identified and funding proposals are now being developed. Ag-West Bio's goal is to enable Saskatchewan's northern communities to increase wild rice production and processing to grow the market value of the crop.

Capturing carbon

Ag-West Bio has been engaged in communications with the internationally renowned Carbon Capture and Storage Knowledge Centre in Regina to build momentum towards the Biomass Energy Carbon Capture and Storage (BECCS) initiative. Saskatchewan is in the enviable position of having world-class engineering expertise in carbon capture, as well as in biomass production, handling and processing. These combined efforts will lead to solutions for retrofitting existing infrastructure to reduce carbon emissions, while using sustainable, renewable feedstock to generate energy.

Greening diesel

Ag-West Bio led the development of a consortium that is paving a pathway to commercialization for renewable green diesel. The plan is to use Canadian proprietary thermo-catalytic deoxygenation (TCD) technology from sustainably produced industrial oilseeds being developed in Saskatchewan over the past decade. The advantage of TCD processing is that hydrogen is not required to produce the green diesel. This technology promises to bring down the production cost to extraordinarily low levels, relative to first generation biodiesel fatty acid methyl ester (FAME). ■



Member Profile

Gravelbourg Mustard

Gourmet products, homegrown on the prairies



I'm passionate about where we live. I want my customers to know this is a Saskatchewan product.



Saskatchewan foodies know all about Gravelbourg Mustard. It has just the right amount of sweetness and heat. Be warned—if you try it you'll be hooked.

Val Michaud, owner of Gravelbourg Mustard based in the town of the same name, was not always in the food industry. Her first business was a hair salon which she opened at the age of 19. Twenty-five years later, the Gravelbourg Mustard business came up for sale and she decided to make the switch.

“When I purchased it in 2011, the business consisted of four recipes and a small amount of product,” says Michaud. “I kept two of the recipes, reformulated the other two to my liking and began production.” She ran both businesses for two years before switching to selling mustard full time.

Eight years later, Gravelbourg Mustard offers 14 products: 10 mustards, mustard seed, a mustard rub, dry mustard and a salad dressing. “We are hoping to also release five more new products this year,” she says.

Michaud began production with some help from family members in a certified kitchen in Gravelbourg. With the expansion of her business she now has a contract with the Saskatchewan Food Industry Development Centre (Food Centre) to process 1,000 kg of product at a time.

“I come up with the new recipes and then have the Food Centre provide nutritional and shelf life information. The Food

Centre processes the product and gets it shelf-ready.”

Michaud is the only full time employee. Besides her contract with the Food Centre, she has also contracted administration and social media support.

The business under Michaud’s leadership has grown exponentially. In 2018 alone, her sales increased by 260 per cent , far surpassing her sales targets. Since 2011 she has found new markets for the product, struck a deal on CBC’s Dragon’s Den, and created a cookbook to show loyal customers how to incorporate her favourite super-food into a wide variety of recipes.

Michaud is proud of being the only gourmet mustard producer in Saskatchewan.

“Awareness of local foods, or at least Canadian foods, is growing. People want Canadian products,” she says. “I’m passionate about my company, but also passionate about where we live. I want my customers to know this is a Saskatchewan product.”

There are, however, some limitations to doing business in Saskatchewan. First is processing infrastructure. “Even though Saskatchewan grows 75–80 per cent of Canada’s mustard, and 40–50 per cent of the world’s mustard, we don’t have a mustard mill. All of that resource gets sent out to Ontario for milling and then sent back to us to turn into the product.”

“Saskatchewan grows mustard well—Food Centre employees can tell Saskatchewan mustard seeds from those grown elsewhere



Val Michaud is proud of being the only gourmet mustard producer in Saskatchewan.

by looking at them. They're bigger and better quality.

The second challenge is distribution, "getting your product out there, brand recognition, and competing with larger companies. Even if you're putting out a completely different product than prepared yellow mustard, I'm still up against them."

Michaud is a new member with Ag-West Bio. She has benefitted from several agricultural programs such as Growing Forward, the Saskatchewan Agri-Value Initiative, and the Saskatchewan Trade and Exporting Partnership. "I recently took part in a 10 week 'Agri-Value Training Program' through Ag-West Bio that supports western Canadian companies with coaching, training on marketing from packaging to distribution, logistics and financial planning."

Several companies from across Western Canada were matched up with coaches and mentors with deep experience in industry. "It was a really valuable experience," she says.

Michaud will continue to innovate with Gravelbourg Mustard, but she also wants to devote more of her time to mentoring fledgling business owners in the region. "It's really important to face some of the fears that you come across and to get out of your own way. Sometimes we stop ourselves from doing what we truly want to do. It has been soul expanding. My next step is to help young entrepreneurs, give them business advice and guidance, and mentor them. I want to give back to others." ■

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My next step is to help young entrepreneurs, give them business advice and guidance, and mentor them.

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Member Profile

Mother Labs

Nurturing the fledgling cannabis industry



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The Mother Labs team is set to nurture the entire industry by improving genetic quality, doing in-house analytics and serving as a nursery for plants for the retail industry

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Brian and Roberta Bain have been in ‘start-up’ mode for six years. They first launched Ecobain Gardens, a 1,200 square-foot indoor vertical farm producing microgreens under T5 grow lights. Two years later they moved on to potted herbs under LEDs in a 6,000 square-foot space.

The team has now finished retrofitting the herb facility to more than 20,000 ft² of growing and operations space within 6,000 ft² of floor space. The company is in the process of becoming licensed as a cannabis nursery, with plans to begin production in June of this year.

They began to make the change when Brian became interested in the new legal landscape of cannabis. Once Health Canada announced there would be nursery licenses, he was in.

A cannabis nursery involves similar standard operating procedures as an herb nursery, but with much larger margins. Their herb facility was built almost perfectly for the new industry, and they were positioned to become one of the first cannabis nurseries in Canada. “We want to take advantage of the potential as cannabis gets off the ground in Canada. We will have increased capital to ultimately commit to sustainable projects, which has always been our passion.”

The new name, Mother Labs, has multiple meanings. The Mother Labs team is set to

nurture the entire industry by improving genetic quality, doing in-house analytics and serving as a nursery for plants for the retail industry.

“We are non-partisan, which gives us an edge against large licensed producers who are competitive with each other. We’ve been welcomed with big smiles and open arms. We’re providing something that is really needed in the cannabis industry, and which will also support the Saskatchewan hemp industry over the long haul.”

Mother Labs serves growers by providing teen plants that are 15 inches tall and ready to flower. “We can increase our customers’ margins substantially by helping to optimize their flowering space, supplying manicured plants that result in reduced labor costs and increased annual flower cycles.”

Besides plant sales, Mother Labs is developing a large analytics lab and gene bank that will serve the industry as a whole. “This sets us up as allies with everybody. If our clients aren’t doing well, we aren’t doing well. We have to offer the best service we can in the industry. Honestly it’s more than the dollars and cents; we’re excited to help the industry evolve.”


Mother Labs has just hired a new Chief Scientific Officer to spearhead research projects even as the retail portion of the business is just getting licensed, speaking to their commitment to both fill a need in the industry and research genetic improvement and new applications.

The cannabis industry's focus right now is on THC (delta-9-tetrahydrocannabinol) and CBD (cannabidiol)—two substances produced in cannabis that are of interest for recreational and medicinal uses. But Brian says there is also huge potential in Saskatchewan for hemp—as a biomaterial, animal feed and many other auxiliary products.

Brian cites several benefits to vertical growing in Saskatchewan—specifically, the climate, the people and the location. “With Saskatchewan’s long, harsh winters, indoor agriculture is a good option. We’re located between the major producers of BC and Ontario, with less competition in our region. We’re well positioned to serve the Prairie provinces. And the province is full of people who support each other.”

“The grow-at-home market will be six per cent of our business, and we have partnered with local Saskatchewan retailers, and are currently in discussions with Alberta Gaming, Liquor and Cannabis to supply the Alberta retail market as well.”

In any of their start-up formats, the Bains say they appreciate the support of Ag-West Bio. “They have given really solid support and networking. We received a loan as a basil farm, which allowed us to develop our products. Brad Bly, Ag-West Bio’s Director of Commercialization, also recommended my Chief Scientific Officer. Being around the bioscience industry has been great. It’s an amazing resource and we’ll continue to utilize it. Beyond the funding, it’s honestly an amazing network to be a part of.” ■



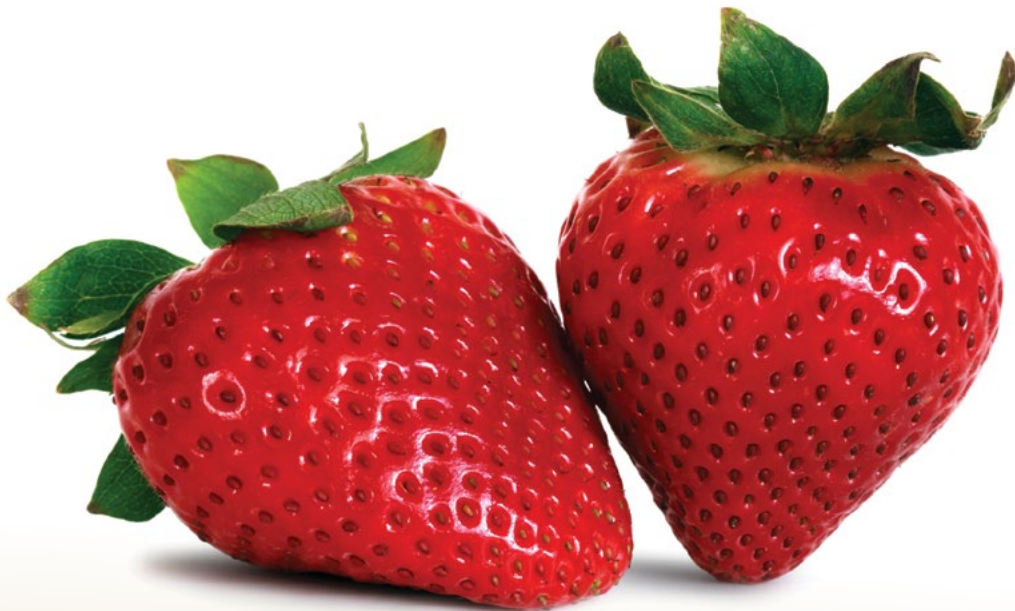
“
It’s more than the dollars
and cents; we’re excited to help
the industry evolve.
”

Serving Saskatchewan for 30 years

Member Profile

MustGrow Biologics

Harnessing nature to protect high-value crops



Corey Giasson



Colin Bletsky

This Saskatchewan start-up has taken locally developed technology derived from one of the crops we grow best to solve a major problem: the control of soil-borne pests and diseases in high-value crops such as fruits and vegetables.

MustGrow, formerly MPT Mustard Products and Technologies Inc., has created two generations of a mustard-based soil treatment. President and CEO Corey Giasson says fruit and vegetable growers have been

“**We’ve extracted the natural organic compounds of the mustard seed so growers can use it as they would other chemicals.**”

struggling to control nematodes and fungal diseases in soil. “Until now they have had to rely on harmful chemicals like methyl bromide, which has been banned. Our product, based on third-party independent trials, is just as effective in controlling several soil-borne pests and diseases.”

For decades, growers have planted mustard as a cover crop. Mustard provides an organosulfur compound, allyl isothiocyanate, which, when concentrated, kills fungus and nematodes. “What we’ve done is extracted the natural organic compounds of the mustard seed so growers can use it as they would other chemicals.”

Since 2010, MPT spent over \$9 million and completed more than 110 independent trials to develop the technology. The results have shown that the technology is effective in controlling soil-borne diseases and nematodes. The product has organic certification and is registered with Health Canada and the U.S.- Environmental Protection Agency, as a fertilizer in all key states and as a pesticide in all states except California.

“The company’s second generation technology is in liquid form, but is just as effective as the first generation granular technology. It works very well as a natural pre-seeding soil treatment, soil fumigant, biopesticide and biofertilizer that is as effective as synthetic chemicals,” says Giasson. The second-generation product will be cheaper to transport, more concentrated, and in a form that fruit and vegetable growers can apply through drip lines.



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We're treating pre-plant pests and diseases right now, but potentially you could also treat post-plant, or shipping containers.

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MustGrow COO Colin Bletsky has looked at hundreds of companies in the biological space specializing in biopesticide and biofertility products. He says, “It’s hard to find a biological product that is able to control, rather than suppress, pests and diseases.”

It makes sense to the founders of MustGrow that technology using compounds from mustard seed would be developed in Saskatchewan. “We’re the largest exporter of mustard in the world. Saskatchewan has a lot of research expertise in oilseeds like mustard and canola. Researchers are close to the product,” says Giasson.

The MustGrow team sees great potential and opportunity for their mustard compounds. “We’re treating pre-plant pests and diseases right now, but potentially you could also treat post-plant, or shipping containers. Initially we have one product, but we’ll be doing research on other applications at different stages of the production and commercialization cycle.”

While the target market for the new product is fruit and vegetable growers, MustGrow is looking at other potential markets, such as cannabis, as a potential for expansion. “I’m excited about getting the technology in the fruit and vegetable space, and expanding to support the cannabis industry. If you look at cannabis growers right now, they have a huge issue, and few viable options to control pests and disease that come into greenhouses,” says Giasson.

MustGrow is working on a proof of concept with the National Research Council and Agriculture and Agri-Food Canada to demonstrate that they can control soil-borne pests and diseases that affect cannabis production (such as *Fusarium*, *Pythium* and *Botrytis*) within 24 hours. They’re also testing on greenhouse pests such as gnats and aphids. “These pests and diseases, which come into greenhouses in untreated soil, are affecting cannabis production. We think that our technology will be used to treat the soil before it comes into the greenhouse, and prevent these soil-borne pests and diseases from even entering.”

While Saskatchewan is the natural location for MustGrow, Giasson admits that access to capital can be a problem for start-ups. “Ag-West Bio was a supporter of MustGrow and the technology all the way through. They are a great partner, and offered a loan to capitalize the company. We’re grateful that Ag-West saw value in us, believed in our potential, and helped get us off the ground.” ■

Events & Communications

Business Connections It's all about the people

One thing that we have learned over the years is that business is about people: people making connections, providing services and making products that benefit others. Ag-West Bio creates opportunities for people to get together.

This year, a total of 451 different organizations participated in over 50 events that we hosted or co-hosted.

A few highlights:

- The annual Canola Industry Meetings attracted more than 300 attendees
- Hosted two Social Media training seminars for 10 companies
- Global Biotech Week 2018 attracted 675 attendees to 10 events
- More than 200 people attended the 2019 Agri-Value Forum & Networking Event
- The Ag in the City Science Zone attracted over 150 young families to participate in hands-on science activities
- Over 60 researchers attended our second annual Meeting of Minds

Agri-Value Training Program

This four-month training program consisted of two in-person workshops, online training, coaching and provision of resources, all designed to help businesses develop marketing skills, increase access to markets, learn more about packaging, costing and pricing for retail, and financing information to build long-term marketing and export capacity within the agri-food industry. Thirteen companies participated in the program: three from British Columbia, two from Alberta, and eight from Saskatchewan.

Prairie Biosciences Canada

PBC is a partnership between BioAlberta, Ag-West Bio and Bioscience Association Manitoba. In the past six months, PBC completed six trade missions: World Agri-Tech 2018 (London, England), Future FoodTech (London, England), Bridge2Food (Lille, France), Globe Capital (Toronto), Natural Products Expo West (Anaheim CA), International Biomass Conference and Expo (Savannah GA). This is in addition to five trade missions in the first six months

Right top: Ag-West Bio organizes the annual Canola Meeting and Canola Innovation Day. More than 300 people attended the Saskatoon event in 2019

Right bottom: Ag-West Bio hosted a networking reception at Innovation Place in Regina in March 2019.

PBC is a partnership between BioAlberta, Ag-West Bio and Bioscience Association Manitoba. In the past twelve months, we have completed eleven trade missions





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Human beings are complex. When we don't have (or don't understand) information, we make decisions based on gut feelings.

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Above: Ag-West Bio President and CEO Wilf Keller with federal Minister of International Trade Diversification The Honourable Jim Carr, at Innovation Place Saskatoon.

of the 2018-2019 fiscal year: AGRI Tech Venture Forum 2018, Agritech Israel 2018, BIO International 2018, International Food Technologists Food Expo (IFT18) and the Ag Innovation Showcase. Ag-West Bio was also involved in the Agri Tech Venture Forum in Toronto and assisted with the 12th Plant Protein Ingredients Summit in Saskatoon, both in May.

Communicating the benefits of bioscience

Science communication is more important now than ever. The agriculture industry is up against an aggressive and well-funded 'demarketing' campaign which has been in motion for decades. Social media has given it even sharper teeth. This has created unwarranted fear of effective agricultural technologies, such as genetic engineering and vaccines, even though thousands of studies have proven them safe.

In hindsight we can say that perhaps mistakes were made in the beginning; that the ag companies should have been more transparent and given consumers more information. But even in the early days there were groups working to educate the public and explain the science (including Ag-West Bio). Activists, on the other hand, were using emotion—burning crops and showing scary pictures of corn cobs with fangs and tomatoes speared with syringes. It's a battle of facts and logic against pseudoscience and misinformation.

Human beings are complex. When we don't

have (or don't understand) information, we make decisions based on gut feelings. For most of our existence we were not at the top of the food chain; being wary kept us alive (*maybe it's 'just a shadow'... but what if it really is a tiger!*). Today, even though most of us don't face threats from predators, our brains are still wired for danger.

As the global population grows and the climate changes, genetic engineering can help our scientists quickly develop crops adapted for the changes. In animal agriculture, certain technologies can help reduce greenhouse gas emissions and produce food using fewer resources. If the public doesn't accept these technologies, scientists will be limited in what tools they can use.

Some positives have come out of the scrutiny. The industry has been continuously evolving and improving its practices; the public attention has motivated everyone to review, make corrections if necessary, and think of creative ways to tell consumers the story of a safe, sustainable agriculture system.

The Saskatchewan Ministry of Agriculture has a unit dedicated to improving public trust which monitors these issues, develops strategies and offers grants for projects in the area of agriculture awareness. The Ministry also supports organizations such as Farm and Food Care Saskatchewan and Agriculture in the Classroom Saskatchewan, which work to deliver the message that our food system is trustworthy and sustainable. Ag-West Bio is happy to support the efforts



Above and below right: Ag-West Bio hosts the Science Zone at Ag in the City, with the help of many volunteers. The popular outreach event is held annually at the Lawson Heights Mall.

of these organizations by promoting their programs and partnering when appropriate.

How do we get our messages out to the general public and not just talk amongst ourselves? As organizations and individuals, we need to boast about our industry to everyone we know. And we need help from those who have a deep understanding of human nature: the marketing experts. This will require strategy, a concerted effort and resources. We need to work together. ■



Serving Saskatchewan for 30 years

We are happy to report that our membership continues to increase—with more than 120 members on the roster. Members are widely varied, from public research institutions, to start-ups, to multinationals. We truly appreciate the support and endorsement of our activities as we work to grow the bioeconomy in Saskatchewan.

Financial statements are available upon request.

CANADIAN AGRICULTURAL PARTNERSHIP | **PARTENARIAT CANADIEN pour l'AGRICULTURE**

To mark our 30th anniversary, Ag-West Bio is celebrating the contributions of long-term board members and employees from the past by creating a special membership category for board members who have served for two terms, (a minimum of five years) as well as past employees who have served the organization continuously for at least five years. If you qualify for this special membership, please contact us!

Saskatchewan 

Canada 

Photo sources:

Ag-West Bio
Gravelbourg Mustard
Mother Labs
MustGrow

Become an Ag-West Bio member!

Anyone active in Saskatchewan's bioeconomy should consider membership in Ag-West Bio. It is very affordable, and our many networking events offer tremendous relationship building opportunities. By working together to grow the provincial bioscience sector, we strengthen Saskatchewan's economy in general.

Visit our website to view member profiles: www.agwest.sk.ca



Serving Saskatchewan
for 30 years

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