

# READY TO GROW AND ACCELERATE

THE 2020-21 REPORT FROM  
LETHBRIDGE COLLEGE'S CENTRE FOR  
APPLIED RESEARCH, INNOVATION  
AND ENTREPRENEURSHIP

# > OUR GROWTH AND OUR IMPACT

**Welcome to Lethbridge College's fourth annual applied research report, covering our activities for the 2020-21 academic year.**

This year was filled with exciting developments as we continued to rapidly expand and grow our applied research activities. We secured some of the largest grants in the college's history and ranked 26th in Canada's top 50 research colleges report (and third fastest-growing in the country in terms of research income). We have aligned our applied research with the United Nations Sustainable Development Goals and have incorporated equity, diversity and inclusion in our research portfolio. We were especially pleased to be one of 12 post-secondary institutions to receive an Equity, Diversity and Inclusion grant from the Natural Sciences and Engineering Research Council of Canada.

We've also seen two key pieces of provincial research infrastructure move under Lethbridge College's management in 2020-21, thanks to the transformation within Alberta Agriculture and Forestry that saw the transition of research assets to post-secondaries and the establishment a new funding agency, Results Driven Agriculture Research (RDAR). We now oversee a 385-acre irrigated research and demonstration farm east of Lethbridge, which will support our irrigation science and post-harvest technology research programs and allow us to enhance industry partnerships through corporate investment and applied research funding. We also manage a 60,000-square-foot research and production greenhouse located in Brooks. This state-of-the-art facility complements our newly completed Centre for Sustainable Food Production, a 10,000-square-foot research greenhouse located on our Lethbridge campus that will provide a platform to further enhance and expand research undertaken at the Aquaculture Centre of Excellence.

We were successful in securing two large grants from the Canada Foundation for Innovation to create a physical entity for the Spatial Technologies Applied Research and Training (START) Centre and our Advanced Post-Harvest Technology Centre.

We continue to be a key driver in our local community by supporting economic growth, innovation and sustainability. I hope you enjoy reading about the impact of our work in this report, and I invite you to contact us if there is a real-world problem our team might be able to help you solve.



**Kenny Corscadden, PhD, MBA, PEng, FIET**

Associate Vice President – Research, Innovation and Entrepreneurship







# FLOURISHING OUTCOMES

Every bountiful harvest starts with the planting of a single seed. This philosophy extends to our college's applied research activities, where seeds planted over many years are flourishing into incredible outcomes.

We have seen small pilot projects grow into large-scale research activities, employing multiple researchers, technicians, postdocs and students. We have seen our expertise in just a handful of areas expand into a variety of sectors and industries. And we have seen our small core group in the Centre for Applied Research, Innovation and Entrepreneurship develop into a high-functioning, adaptable and skilled team of dozens of talented people who are making a difference in real-world industries every day.

Our roots may have been modest, but our aspirations are not. This past year, we were recognized as one of Canada's fastest-growing research colleges, which is representative of our increased focus on serving the needs of industry, of helping our partners find new and innovative ways of doing business, and of creating opportunities for our researchers to undertake projects that match their skills and passions.

Our doors are wide open, and we encourage any business in search of solutions to seek out our team to help. We are committed to applied research, innovation and entrepreneurship that promotes sustainability and diversity. We have a proven track record of taking ideas from concept to completion (or, from seed to harvest). And we have the expertise to be able to pursue grants that support projects that strengthen our province's economy.

We are proud of the work we have done, and I look forward to seeing how our operations will continue to grow in the upcoming year.

**Paula Burns, PhD, MBA**  
President and CEO



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*Located on the traditional lands of the Blackfoot Confederacy, Lethbridge College is committed to honouring the land from a place of knowing. We honour the Siksikaitsitapi as both the traditional and current Land Keepers of this area, and we welcome all First Nations, Métis, Inuit and non-Indigenous peoples who call Blackfoot territory their home.*

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CENTRE FOR  
**APPLIED RESEARCH,  
INNOVATION AND  
ENTREPRENEURSHIP**

# > READY TO WIDEN OUR HORIZONS

## APPLIED RESEARCH AT LETHBRIDGE COLLEGE CONTINUES TO EXPAND AND FLOURISH, WITH MORE PROJECTS MOVING FROM PROTOTYPES TO FULL-SCALE RESEARCH PROGRAMS

Applied research at Lethbridge College – like all good research – started small with a big idea.

It was 1989, and college researchers and their industry partners at Alberta Agriculture and the Eastern Irrigation District wondered: could they use fish to control rooted aquatic vegetation in irrigation canals?

If so, it would be a cost-effective way to reduce the need for herbicide application to canals and enhance the flow of water in vegetation-impacted canals. That could have a real benefit to many working in the agriculture industry. So, using best practices, they tested and studied sterile grass carp in small, isolated ponds and sections of irrigation canal for several years, finding the carp were, in fact, effective at controlling the weeds.

This first successful research project led to other bigger research questions over the years. Those questions brought in new partners, led to the development of new technologies, and have helped to grow a small team of researchers into the robust and thriving aquaculture and aquaponics research program that exists at Lethbridge College today. That one small project has grown into a program that has received millions of dollars in grants, resulted in new facilities, created rewarding work-integrated learning opportunities for students, and helped to establish Lethbridge College and its researchers as Canadian and International experts when it comes to integrated self-sustainable food production systems.







This pattern – starting small and growing from there – is one that has played out time and again in the Centre for Applied Research, Innovation and Entrepreneurship (CARIE). The college's commitment to applied research has grown consistently the last 33 years and exponentially the last six, illustrated in the number of dedicated researchers, projects, student and staff participants, and campus facilities supporting a variety of programs.

Like the grass carp project, all of these efforts started small. At one point, the irrigation research was conducted in a small demonstration bin in the Innovation Space on campus. Now it takes place on the college's 385-acre Research and Demonstration Farm. The initial post-harvest technology research started

with the hiring of one talented researcher. Now it involves international post-doctoral fellows and research associates working to solve significant post-harvest storage problems and rapidly expanding research infrastructure thanks to a grant of nearly \$1 million from the Canada Foundation for Innovation. And the first spatial technology work at Lethbridge College started with an \$8,100 Connect Grant from NSERC to fund the world's first VR/AR conference held entirely in virtual reality. This year, Spatial Technologies Applied Research and Training (START) received a \$410,921 grant from the Canada Foundation for Innovation to invest in new equipment and infrastructure, including building a new motion-capture studio on campus.



## IN ADDITION TO ITS WORK IN AQUAPONICS AND SUSTAINABLE FOOD PRODUCTION, LETHBRIDGE COLLEGE RESEARCHERS ARE ALSO BUILDING PROGRAMS SUCH AS:

- the Mueller Irrigation Group, led by Dr. Willemijn Appels, is a vital resource for field crop production in southern Alberta, where water scarcity and management are major concerns;
- the Advanced Post-harvest Technology Centre, led by Applied Research Chair Dr. Chandra Singh, which focuses on innovating post-harvest technology to help industry maximize yield and minimize losses; and
- the Spatial Technologies Applied Research and Training (START) Centre, led by President's Applied Research Chair in Virtual and Augmented Reality Mike McCready, which is dedicated to connecting industry with the limitless potential of spatial technologies.



Aquaponics research at Lethbridge College is led by senior research scientist Dr. Nick Savidov (left) and John Derksen, who is chair of the Aquaculture Centre of Excellence. The ACE team has helped place Alberta and Lethbridge College at the forefront of this developing industry.



This successful formula has been applied to research in the humanities and social sciences as well – where instructors are encouraged to apply for internal research grants to get a taste of the rewarding world of applied research and innovation. The pattern has played out in terms of grants the CARIE team has received over the years as well. The college was first eligible to apply for federal NSERC funding in 2010, and received one of its first NSERC awards in 2013, for \$200,000. In the 2020-21 academic

year alone, the CARIE team received more than \$6.8 million in sponsored research income from government grants and industry contributions. In the following pages, we invite you to read more about how Lethbridge College's CARIE team has established a proven record of managing and delivering on multiple, concurrent projects with industry, moving from small-scale prototype projects into full-scale, thriving research programs that are making a difference in the communities across the country.

WE HAVE ALIGNED OUR APPLIED RESEARCH WITH THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS AND HAVE INCORPORATED EQUITY, DIVERSITY AND INCLUSION IN OUR RESEARCH PORTFOLIO.



Learn more about these goals at [un.org/sustainabledevelopment](https://un.org/sustainabledevelopment)

**Kenny Corscadden, PhD, MBA, PEng, FIET**

Associate Vice President – Research, Innovation and Entrepreneurship

# > GETTING TO THE ROOT OF THE MATTER

Dr. Willemijn Appels' interest in irrigation science runs deep. Lethbridge College's Mueller Applied Research Chair in Irrigation Science is looking beneath the surface of the soil for practical solutions to the challenges facing farmers in irrigation-dependent southern Alberta. Appels and her team are working with Alberta producers to assess new techniques and technology for efficiently delivering water to thirsty crops.

"It is really great to work with farmers and to do research on operations that are in commercial use who can tell you immediately whether the work you're doing is of value to them," says Appels.

At the same time, Appels's research has been bolstered by the addition of new infrastructure, the Lethbridge College Research and Demonstration Farm [see story on page 22], which will enable her team to perform experiments in a field setting with a level of scientific rigor not possible in a commercial operation.

"Some research questions require repeated measurement and knowing exactly what happens where and when," she explains. "At our farm, we can make sure that the experimental procedure is rigid, that statistical analysis makes sense and that the trial works from start to finish, which you can't expect a commercial producer to do for you. We can also test technology and instruments that are not quite farm-ready."





“AT OUR FARM, WE CAN MAKE SURE THAT THE EXPERIMENTAL PROCEDURE IS RIGID, THAT STATISTICAL ANALYSIS MAKES SENSE AND THAT THE TRIAL WORKS FROM START TO FINISH.”

Dr. Willemijn Appels



# FINDING FERTILE GROUND FOR SUBSURFACE IRRIGATION RESEARCH

Subsurface drip irrigation (SDI) is gaining popularity in Alberta, currently covering 1,090 hectares of field crop area. While SDI has been shown to provide benefits such as more efficient water use, when compared to surface irrigation methods, there are few scientific studies on subsurface fertigation specific to Alberta crops and soil conditions.

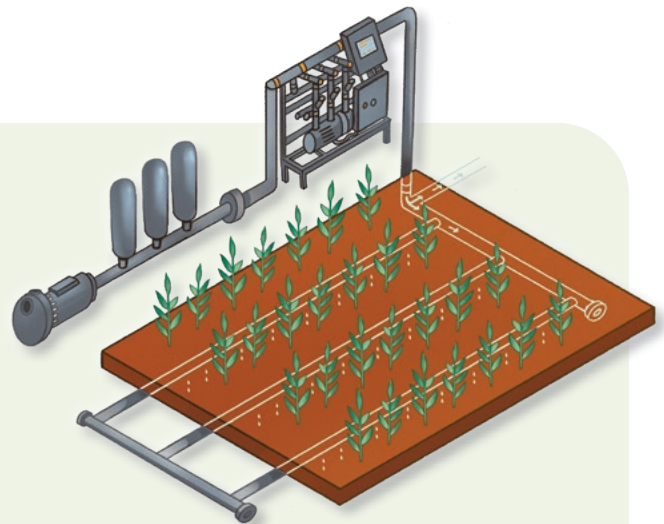
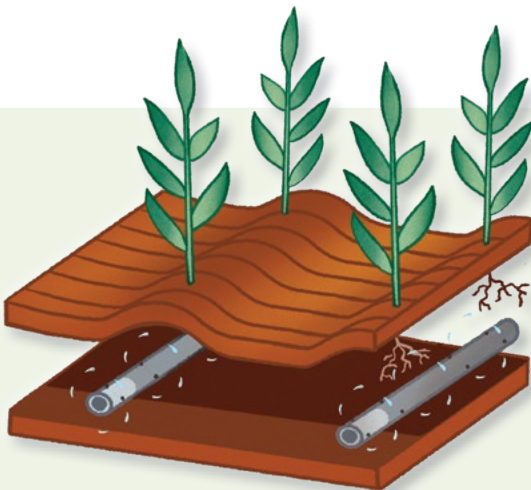
Gearing up for large scale irrigation and fertigation trial at the Research and Demonstration Farm, Lethbridge College's Mueller Irrigation Group is partnering with industry leader Southern Irrigation.

The trial builds on the work of Dr. Rezvan Karimi Dehkordi, a research associate in the Mueller Irrigation Group who recently completed a two-year study funded by a \$47,705 grant from the Canadian Agricultural Partnership. That grant explored how using subsurface drip fertilization (SDF), a method that applies water and fertilizer directly to the rootzones of plants, affects uptake of nutrients, leading to increased crop yields.

"Most of the data we have is from the U.S. on crops like alfalfa, cotton and soybeans," says Karimi Dehkordi. "We don't have enough information for Alberta farmers specifically on the best timing and rate of application. Without independent local data, it is not possible to provide realistic scenarios to agricultural producers about the value of SDF."

Karimi Dehkordi worked with First Fruit Farms near Lomond, Alta., to test different fertilizer applications on durum wheat in 2019 and pinto beans 2020; she then compared the results with a control crop that did not receive any fertilizer.

After installing the SDI system at the Research and Demonstration Farm and carrying out some preliminary irrigation and fertigation tests this summer, the team is set to begin large scale trials in 2022.



Lethbridge College's irrigation science team is gearing up for large scale irrigation and fertigation trial at the Research and Demonstration Farm, part of an ongoing partnership with industry leader Southern Irrigation. The trial builds on earlier work that explored how using subsurface drip fertilization (SDF), a method that applies water and fertilizer directly to the rootzones of plants, affects uptake of nutrients, leading to increased crop yields.



## CANOLA COLLABORATION TO BENEFIT LOCAL PRODUCERS



Southern Alberta canola producers stand to benefit from a joint research project by Lethbridge College and Farming Smarter.

The project will study the effects of strip tillage and precision planting on canola crops. The Natural Sciences and Engineering Research Council partly funds this three-year, Applied Research and Development grant with \$75,000 per year.

The research aims to increase crop emergence and seed yield in canola under western Canadian climate conditions by using improved crop production practices. Leading the research is Dr. Rezvan Karimi Dehkordi at the college and research scientist Dr. Gurbir Dhillon at Farming Smarter.

## MOISTURE MAPPING TECHNOLOGY PILOT PROJECT

Irrigation researchers at Lethbridge College have contributed to optimizing the amount of water needed to grow crops in a variety of fields, but new funding will allow the team to get a larger scale view of how much moisture is present below the surface, with a goal of allowing producers to adjust irrigation on the fly.

This three-year project, funded by Results Driven Agriculture Research for \$420,658, will use microwave radiometer technology to create maps of the water in the soil that is available to plants and translate that data to adjust how much water is added through irrigation.

"This technique gives us a map of the moisture in an entire area, instead of just a point observation you get when you install something in the ground," says Dr. Willemijn Appels, Mueller Applied Research Chair in Irrigation Science. "It gives promise that you can adjust your irrigation water management to match what is already present in the ground, and adjust while the pivot is moving

because the sensor is located on top of the pivot. Ideally, in the future, the sensors would be used to estimate soil moisture conditions just ahead of the sprinklers. Then after doing some calculations the amount of water the sprinklers put on would be adjusted while the pivot is moving."

Currently, most producers base their irrigation levels on a rough classification of available moisture, based on general texture classifications. The data collected in this study aims to provide a more precise and repeatable measurement to take some of the guess work out of irrigation.

"In this project, we plan to figure out how we can make the estimates either easier or determine what strategy producers could apply to map out their property," says Appels. "Producers can then take their observations and match it with data from those sensors and create a map for their irrigation application instead of programming a single irrigation volume for the entire field."

# ADVANCING INNOVATION > IN POST-HARVEST AGRICULTURE





**“YOU CAN’T CONTROL MOTHER NATURE, BUT IF YOU HAVE GOOD INFRASTRUCTURE AND ARE PROACTIVE, YOU CAN PLAN AHEAD AND REDUCE THE RISKS.”**

**Dr. Chandra Singh**

Since joining the college’s Centre for Applied Research, Innovation and Entrepreneurship as its first applied research chair in Agricultural Engineering and Technology in 2019, Dr. Chandra Singh has cultivated a bumper crop of research projects and partnerships.

With more than \$4.5 million in grants brought in over the past year, including \$935,490 from the Canada Foundation for Innovation towards the creation of the Advanced Post-Harvest Technology Centre, Singh and his team have dramatically increased their capacity to help producers reduce post-harvest crop losses and increase yields and returns.

The grant for the Advanced Post-Harvest Technology Centre will help address increasing global food demands. One-fifth of all food produced in Canada is avoidably lost or wasted during harvesting, packing, storing, handling, transporting and processing. “You can’t control Mother Nature,” says Singh, “but if you have good infrastructure and are proactive, you can plan ahead and reduce the risks.”



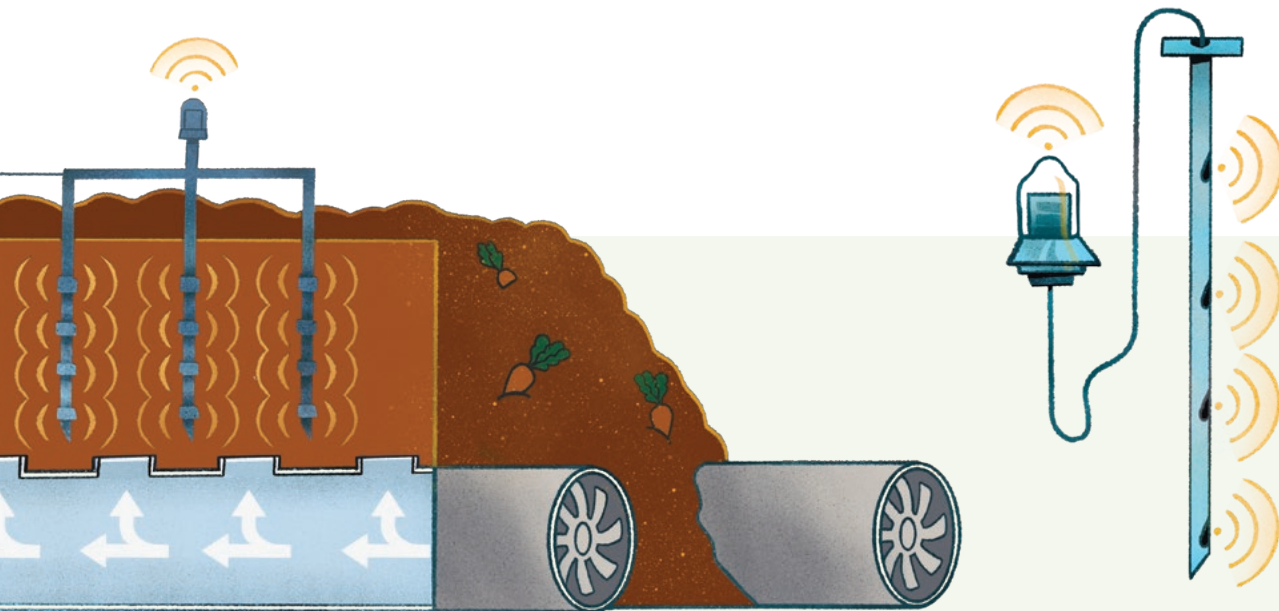
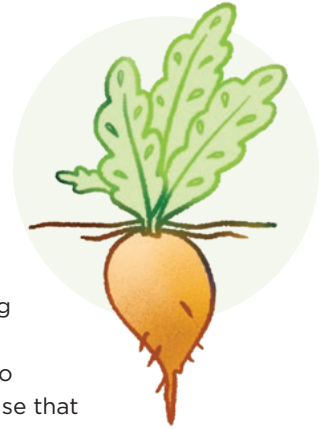
## > BEATING THE ELEMENTS WITH TECH

Sugar beet farming and processing is a significant contributor to the southern Alberta economy, contributing \$32.2 million in farm receipts annually. But growers and processors face unique challenges with this crop. Freshly harvested sugar beets are stored outdoors during the winter months in bulk piles weighing up to 50,000 tonnes before being processed at the Rogers and Lantic factory in Taber, the only sugar beet processing facility in Canada. However, insufficient ventilation can leave sugar beets vulnerable to temperature swings, which can cause the roots to lose sugar or rot.

Singh's project aims to develop a remote wireless sensing system for monitoring the temperature in the piles and an efficient aeration system to control it.

"We will have wireless sensors inside the piles that will send temperature data to the cloud and the user can see it remotely," explains Singh. "The sensors will also use that data to make a smart decision to tell the fan when to turn on in order to maintain a target temperature. This process will be completely automated, so you don't have to have people going out and physically checking the piles."

The three-year project is a research collaboration with Lethbridge College, Lantic and the Alberta Sugar Beet Growers (ASBG), with Calgary's OPIsystems providing technical support. Funding for the project, in the value of \$236,083, comes from the Alberta Innovates Smart Agriculture and Food Digitization and Automation Challenge.



In this automated process, wireless sensors inside the piles send temperature data to the cloud, and users can see it remotely. The sensors will also use that data to make a smart decision to tell the fan when to turn on, which maintains a target temperature.



## GRAIN DRYING PROJECT AIMS TO CURB INDUSTRY LOSSES

Using improved storage technology and methods, a new research project from Lethbridge College is aiming to help Alberta grain farmers bring their crops in earlier and preempt big losses.

“Such huge risks to the crops can be minimized by harvesting crops as soon as they reach maturity and grain can be artificially dried,” explains Dr. Chandra Singh, the college’s applied research chair in Agricultural Engineering and Technology. “The technologies we are exploring in this project could allow farmers to start harvesting earlier to minimize adverse weather effects and to better manage the in-storage grain with minimum spoilage risk.”

Singh and his team will deploy wireless smart sensing technology to monitor in-bin grain storage conditions, including temperature and moisture levels, as well as an advanced automated fan and heater control system to dry the grain.

The project, one of the largest and most comprehensive on-farm grain-drying studies to be conducted in Western Canada, is jointly funded by Alberta Wheat Commission, Results Driven Agriculture Research, Alberta Innovates, Canadian Agricultural Partnership, and Saskatchewan Wheat Development Commission and is valued at \$576,420.

## POTATO VARIETY TRIAL YIELDS INITIAL RESULTS

College researchers completed this year’s field work to test potato varieties in Alberta soil and growing conditions. The multi-year project, a partnership between Lethbridge College, Agriculture and Agri-Food Canada, Canadian Horticulture Council, Potato Growers Association and potato industry partners, took place at the Crop Diversification Centre South in Brooks. More than 40 different kinds of potatoes were grown over the course of the field work. The crop of spuds will be evaluated by the team and agronomic, yield and quality data will be shared with the partners, which also includes potato industry partners Lamb Weston, Old Dutch and The Little Potato Company.

**In the past year, Dr. Chandra Singh and his team have brought in more than \$4.5 million in grants, including \$935,490 from the Canada Foundation for Innovation towards the creation of the Advanced Post-Harvest Technology Centre.**





“THIS IS THE LAST STEP IN  
PROVING ANY RESEARCH  
BEFORE THE ADOPTION OF NEW  
TECHNOLOGY BY INDUSTRY,  
AND NOW WE’LL HAVE IT.”

**John Derksen**

## > COLLEGE OPENS NEW ON-CAMPUS GREENHOUSE

After more than 20 years, Lethbridge College's longest running applied research program, the Aquaculture Centre of Excellence (ACE), is still going strong.

That work is enhanced with the opening of the new, much-anticipated 10,000-square-foot greenhouse that houses the CFI-funded Centre for Sustainable Food Production (CSFP). This centre works in conjunction with ACE to conduct trials in aquaponics, bioreactor technology and integrated plant production systems at a pre-commercial scale.

“This is the last step in proving any research before the adoption of new technology by industry, and now we have it,” says John Derksen, chair of the ACE. ACE and the CSFP continue collaborate with industry and the community to solve real world issues through applied research.



## FISHING FOR ANSWERS TO STURGEON DISEASES

A Lethbridge College research project is giving insight into southern Alberta's sturgeon population while offering students valuable first-hand experience in the field. The project, which is led by John Derksen, chair of the Aquaculture Centre of Excellence (ACE), and college researcher Kristine Wilson, aims to develop a greater understanding of viruses affecting sturgeon in the South Saskatchewan River basin.

Derksen says the ACE team is interested in bringing in farmed sturgeon from British Columbia, but the research project needs to determine that the farmed fish won't carry any diseases that wild domestic fish don't already have. Derksen says their vision is to increase public awareness of this endangered species, enhance the competitiveness of the sturgeon aquaculture industry in Canada and showcase aquaponics as an environmentally sustainable, economically feasible approach for rearing sturgeon for caviar. To gain real-world experience, the project also employed four summer students – Abigail Doerksen, Dongjin Kim, Kira Sawatzky and Joel Smith – from the college's School of Environmental Sciences program.

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## FOOD FOR PLANTS, BY FISH

In 2020, the Aquaculture Centre of Excellence teamed up with Granary Road Active Learning Park near Calgary to showcase how aquaponics systems can be used to grow delicious fresh produce, including tomatoes, salad fixings, basil and microgreens. The partnership also yielded a new product: a plant fertilizer made entirely from the waste byproducts produced in the aquaponics process. Plant Food is an all-natural product with no chemical additives that is good for use on vegetables, herbs, flowers and more. It is available for sale at the Granary Road Farmer's Market.



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## AQUAPONICS MICROCREDENTIALS LAUNCHED

The expert scientists in ACE have launched a new series of microcredentials that will provide aquaponics training to everyone from high school students to interested amateurs to experienced greenhouse technicians. Aquaponics is an integrated system in which fish and plants are grown together within a recirculating system.

Microcredentials allow flexible learning that can be accessed at any time and completed at the user's own pace. Six of 10 microcredentials are currently available. Learners can choose a combination of modules that meet their individual needs from a range of topics from plant physiology to water chemistry to the economics of aquaponics. Upon completion, the user receives a badge signifying they have completed the course. Learn more about this program and other solutions for individuals, businesses and organizations at [lethbridgecollege.ca/lcextension](http://lethbridgecollege.ca/lcextension).

# > EXPLORING (VIRTUAL) SPACE

For Lethbridge College's Spatial Technologies Applied Research and Training (START) Centre, this year presented opportunities to build awareness of the possibilities virtual and augmented reality (VR/AR) technology bring.

Since spring 2020, Lethbridge College and Economic Development Lethbridge have collaborated to bring virtual events to businesses and organizations in the Lethbridge region utilizing the AltSpaceVR platform. In September 2020, the partners came together to host Automation in Supply Chain - A Gamified Experience that transported participants into a virtual conference hall, complete with breakout rooms where participants could see automated technologies in-person.

In June 2021, the START initiative hosted the fourth annual Merging Realities event (in a virtual space, of course), which took a deeper look at how VR/AR can help businesses of all sizes. The program included presentations from industry partners, including Alvin Fritz who shared how VR/AR has helped modernize his architecture business, and a showcase of work by students from the college's VR/AR program.

Thanks to a \$410,921 grant START received from the Canada Foundation for Innovation (CFI), along with funding from other sources, the team will be able to invest close to \$1 million in new equipment and infrastructure, including building a new motion-capture studio on campus, developing a state-of-the-art driving simulator, acquiring high-end computing capabilities for artificial intelligence and machine learning, and purchasing advanced 3D scanning equipment to increase their capacity to develop virtual experiences for industry and community partners.

Already, they're nearing completion on an immersive VR training platform to help caregivers manage scenarios that people who care for those with dementia might face, and enabled visitors to the Grande Cache Tourism and Interpretive Centre in the Municipal District of Greenview to follow in the footsteps of dinosaurs. The team has also worked on creating VR experiences from the ground (through an irrigation experience) to the sky (through a wind turbine torquing lab VR prototype). Looking ahead, projects will focus on helping companies develop immersive prototypes to train employees for dangerous jobs.

"Although multiple industries are exploring the integration of VR and AR technologies into their operations to enhance employee safety, improve business process efficiency, and reduce costs, many companies lack the expertise and equipment to articulate a vision and develop immersive experiences," says Mike McCready, the President's Applied Research Chair in Virtual and Augmented Reality. "This CFI investment will enable START to address this gap."



“MANY COMPANIES LACK THE EXPERTISE AND EQUIPMENT TO ARTICULATE A VISION AND DEVELOP IMMERSIVE EXPERIENCES... THIS CFI INVESTMENT WILL ENABLE START TO ADDRESS THIS GAP.”

**Mike McCready**



# > APPLIED RESEARCH BY THE NUMBERS

**\$6.8**  
MILLION

TOTAL SPONSORED RESEARCH INCOME FROM GOVERNMENT GRANTS, INDUSTRY CONTRIBUTIONS AND DONATIONS IN 2020-21

TOTAL NUMBER OF RESEARCH PARTNERSHIPS IN 2020-21

**75**

LETHBRIDGE COLLEGE'S PLACE ON RESEARCH INFOSOURCE'S ANNUAL RANKINGS OF CANADA'S TOP 50 RESEARCH COLLEGES. THE COLLEGE JUMPED FROM 47<sup>TH</sup> SPOT IN THE RANKINGS.

**26<sup>TH</sup>**



**3<sup>RD</sup>**

3RD FASTEST GROWING COLLEGE ON RESEARCH INFOSOURCE'S ANNUAL RANKINGS

**11**

DEDICATED RESEARCHERS



29

PAID STUDENT RESEARCHERS

27

RESEARCH PROJECTS  
COMPLETED IN 2020-21

26

NUMBER OF FACULTY INVOLVED IN  
APPLIED RESEARCH



SQUARE FOOTAGE OF LETHBRIDGE COLLEGE'S  
GREENHOUSE RESEARCH FACILITY AT BROOKS.

60,000

FISH POPULATION AT THE AQUACULTURE CENTRE OF  
EXCELLENCE INCLUDING 13,000 RAINBOW TROUT, 3,700  
WALLEYE AND 12,000 TILAPIA.

28,700

SQUARE FOOTAGE OF THE ON-CAMPUS GREENHOUSE

10,000

# CULTIVATING > PARTNERSHIPS IN THE AGRICULTURE INDUSTRY







The Integrated Agriculture Technology Centre (IATC) at Lethbridge College launched in April 2020. The centre, one of 60 Technology Access Centres (TACs) nationwide, operates with base funding from a \$1.75 million five-year renewable grant from the Natural Sciences and Engineering Research Council of Canada (NSERC) and generates revenue by providing small- and medium-sized agricultural enterprises with affordable and accessible access to the research expertise at the college.

In 2020-21, the IATC worked with diverse clients in the agriculture industry on applied research projects, funding through provincial and federal grants and private industry fee-for-service contracts for research and technical services. The first year of operation saw the IATC exceed its revenue targets by over 400 per cent, demonstrating the great need for agriculture research in the region.

The IATC is ready to help Canadian agricultural businesses—particularly small- and medium-sized enterprises—by providing applied research and innovation services to enhance productivity, competitiveness and innovation results. It can be the bridge between the problems businesses want to solve and the wealth of expertise of Lethbridge College's dedicated researchers, faculty and staff.

**\$777**  
THOUSAND

**\$777,420 IN TOTAL REVENUE FROM IATC IN 2020-21**

**18**

**COMPANIES THE IATC WORKED WITH IN 2020-21**

**\$169**  
THOUSAND

**\$169,000 IN REVENUE FROM FEE-FOR-SERVICE AGREEMENTS**



# ALBERTA AGRICULTURE AND FORESTRY INFRASTRUCTURE HELPS GROW RESEARCH

In October 2020, the Government of Alberta's Ministry of Agriculture and Forestry transferred management of the Alberta Irrigation Technology Centre (AITC) – now referred to as the Lethbridge College Research and Demonstration Farm – and the Brooks Research and Production Greenhouse to the college as part of its Centre for Applied Research, Innovation and Entrepreneurship. The farm allows Lethbridge College researchers to conduct research at a scale that Alberta's farmers can then apply to their operations. The greenhouse allows college researchers to complete pre-commercial research and validation that leads to commercial application in a rapidly expanding greenhouse industry. The \$2 million agreement adds established infrastructure and experienced staff members to the college's applied research team, increasing the college's research capacity while benefitting all Albertans in the agriculture industry.



## **RDAR COMMITS \$783K TO GROW ALBERTA'S GREENHOUSE SECTOR**

Lethbridge College and Sunterra Farms Greenhouse Ltd. recognize that current demand for fresh, locally grown produce far exceeds the available supply in a market reliant on Mexican- and U.S.-imported fruits and vegetables and that the greenhouse sector in Alberta is ready for expansion. Together, the college and Sunterra are conducting an applied research project to optimize the growing conditions for pre-commercial and commercial-scale production of strawberries and tomatoes on the vine as they look to boost Alberta's crop output during times of limited supply and low import quality.

Results Driven Agriculture Research has invested \$783,205 to advance innovative indoor growing techniques in Alberta. The work will occur at the college's Brooks Research and Production Greenhouse and Sunterra's new 20-acre state-of-the-art greenhouse in Acme, Alta.

## **LETHBRIDGE COLLEGE AND OLDS COLLEGE SIGN AGRICULTURE RESEARCH MOU**

Lethbridge College and Olds College have signed a memorandum of understanding (MOU) focused on applied agriculture research, which will benefit both institutions as well as the province's primary producers, businesses and agencies throughout the agri-food supply chain. To launch the agreement, both colleges have signed on to the United Nations Sustainable Development Goals, becoming the first two colleges in Alberta to sign the SDG Accord. The accord calls upon institutions of higher learning to embed the SDGs into education, research, leadership, operations, administration and engagement activities.

As part of the MOU, Lethbridge and Olds colleges will work together to identify joint projects, refer companies to each other based on the best fit with infrastructure and research expertise, and share relevant data and data networks. With both college's boasting agriculture-based Technology Access Centres, which offer industry support through applied research and technical services, Lethbridge and Olds will work collaboratively to provide an attractive, consistent and competitive fee structure for industry partners.

## **CFI AWARDS COLLEGE TWO GRANTS FOR MORE THAN \$1.3 MILLION**

Lethbridge College received one of the most significant financial boosts to its applied research activities in the college's history in July 2021. The Canada Foundation for Innovation (CFI) has awarded two grants to Lethbridge College, totaling more than \$1.3 million. The approved projects include \$935,490 for Dr. Chandra Singh's work towards creation of the Advanced Post-Harvest Technology Centre, and \$410,921 for Mike McCready's work in the Spatial Technologies Applied Research and Training (START) Centre. The projects are funded through CFI's College-Industry Innovation Fund, which supports productive partnerships between Canadian colleges and institutions, and businesses.



# > PLANT-BASED ANTIBIOTICS RESEARCH RECEIVES BOOST

"IT'S GREAT EXPOSURE FOR  
OUR RESEARCH...YOU NEVER  
KNOW WHEN A POTENTIAL  
PARTNER MAY BE WATCHING."

Dr. Sophie Kernéis





The work of microbiology senior research scientist Dr. Sophie Kernéis and lab technician Leanne DuMontier received a boost this year when their lab was recently federally certified to handle Level 2 pathogens – the bacteria, viruses and other microorganisms that cause disease. Previously, the lab was only able to work on non-pathogens.

The new certification aids the work of the Antibiotic Alberta Plant Project, launched by Kernéis in 2016, which is focused on developing antibiotics from plants found in Alberta. Her team has already collected 117 samples from different plant families and identified two molecules with antibiotic properties.

Kernéis and DuMontier have trained 19 research students from Lethbridge College, the University of Lethbridge, the University of British Columbia and the University of Alberta. The lab also collaborates with researchers from the University of Lethbridge and the University of British Columbia, and it has received funding from The Natural Sciences and Engineering Research Council of Canada and the college's Centre for Applied Research Internal Fund. To keep the work moving, Kernéis hopes to connect with an industry partner, so the team is seizing opportunities to talk about their findings. In June, Kernéis presented to the Canadian Poultry Research conference on phytobiotics to serve the poultry industry. Phytobiotics are plant-based alternatives to antibiotics. Potentially, plants with antibiotic properties could be added to chicken feed to deter bacterial infection in flocks.

Nadia Hand, a recent University of Lethbridge graduate and recipient of a \$20,000 a year McCain's Foundation scholarship in support of her master's thesis, has been working in Kernéis' lab for more than 18 months. Hand presented her work on techniques for treating *Staphylococcus epidermidis* (a common bacteria found on skin) with plant extracts at the Undergraduate Research in Science Conference of Alberta (URSCA) in May and at the National Health Product Research Society conference in June. Apsara Srinivas and Audrey Golsteyn, two University of British Columbia students who have been volunteering with the plant project, also presented their analysis of plant extracts at URSCA, which showed as much as a 12-hour delay in bacterial growth.

"It's great exposure for our research," Kernéis says. "The conference sessions were recorded, and they're posted on YouTube. You never know when a potential partner may be watching."

Senior research scientist Dr. Sophie Kernéis (left) and lab technician Leanne DuMontier (right) have received federal certification this year to handle Level 2 pathogens.



# > INTERNAL GRANTS BUILD RESEARCH CAPACITY

**To encourage faculty and staff to take on new projects and build research capacity, Lethbridge College offers funding through Centre for Applied Research Internal Fund (CARIF) grants. Faculty can also access Social Sciences and Humanities Research Council (SSHRC) grants through the college to support small-scale research and related activities to strengthen research excellence and foster the professional development of students.**

One recent CARIF-funded project saw Dr. Jeanine Webber, the college's former Dean of the Centre for Justice and Human Services, and Ibrahim Turay, an instructor and researcher in that centre, explore why are women under-represented in leadership roles in the Alberta Correctional Services Division.

The pair studied the real and perceived barriers preventing women from ascending to leadership positions, the key resources women need to support their leadership aspirations in the division, and the pathways that have proven effective in the past for women in leadership. The project wrapped up in August 2021 and the results have been shared with the division to help provide direction and insights to an organization that is looking to enhance leadership opportunities for women.

In 2021-22, CARIF will support six CARIF grants and three SSHRC grants to nine different researchers.



SSHRC  CRSH

Ibrahim Turay, an instructor and researcher in the Centre for Justice and Human Services, worked with former Dean Dr. Jeanine Webber on a CARIF-funded project that explored why women are under-represented in leadership roles in the Alberta Correctional Services Division.





## CARIF-FUNDED PROJECTS:

- 1 **The Green Cosmetic Preservatives – Dr. Sophie Kernéis.** The Plant Antibiotic Program at Lethbridge College has unique plant extracts that can help the cosmetic industry as it looks for green solutions to replace the chemical antimicrobial preservatives commonly used in their products.
- 2 **Exploring the Efficacy of Augmented and Virtual Reality in the Assessment and Development of Movement Skill Proficiency in Children – Dr. Simon Schaerz.** This project seeks to explore the efficacy of leveraging augmented and virtual reality technologies to assess and develop movement skill proficiency in children with the ultimate goal of promoting childhood physical activity engagement.
- 3 **Quantifying Justice: Metrics and Ethics in Canadian Criminal Justice – Dr. Gary Barron.** Examines the production and effects of statistics and performance metrics in the justice system, asking what are the consequences for the public good, individual agency, shaping of criminal justice and the organization of society?
- 4 **Leveraging Biometrics to Enhance Learning in Immersive Environments – Dave Maze and George Gallant.** This project aims to develop an intelligent training system that can analyze the learner's behaviour during confrontations with aggressive individuals and other crisis situations, and to provide appropriate feedback, enabling learners to improve their performance.
- 5 **Games meet Films: Utilization of Virtual Production for Independent Filmmakers – George Gallant and Allyson Cikor.** This project aims to discover if new virtual production workflows in the film industry are a viable alternative for small budget productions by producing a short film, both with the traditional and virtual production process, and then compare the cost and creative opportunities they both present.
- 6 **Urban Wildlife Coexistence – Josh Hill.** This project will explore the multi-city dimension of previous research around human perceptions of wildlife interactions as well as coordinate ecosystem management and conservation efforts in our national parks.

## SSHRC-FUNDED PROJECTS:

- 1 **Find Your Voice: Author Visits and Conference Activity at Lethbridge College (SSHRC Exchange Grant) – Dr. Amy Hodgson-Bright.** Supports student writers by inviting authors to speak virtually to students and plans for a virtual conference to be held at Lethbridge College in 2023.
- 2 **Creating Opportunities for Lethbridge College Students' Writing and Publication: Launching a Student-Run Literary Magazine (SSHRC Explore Grant) – Dr. Amy Hodgson-Bright.** A project postponed from 2020 to create a student-run campus literary magazine to showcase students' creative writing work and provide those writers with opportunities to collaborate on the writing, editing, and publication of a magazine.
- 3 **Justice by Numbers: The Politics of Quantification and Statistics in the Canadian Justice System (SSHRC Explore Grant) – Dr. Gary Barron.** Quantitative indicators are typically regarded to solve the imperative of governing from a distance and ensuring accountability and transparency but may also replace democratic deliberation on matters of collective concern. This topic is important to understand how we live as citizens of a democracy under rule of law.

# EQUITY+ DIVERSITY+ INCLUSION

## BREAKING DOWN BARRIERS IN RESEARCH

“IT’S THROUGH CREATING A CLIMATE OF INCLUSION THAT WE CAN HEAR MULTIPLE DIVERSE PERSPECTIVES, LEAN INTO INDIVIDUALS’ INTERESTS AND SKILLS AND CREATE AN ENGAGED WORKFORCE. IT’S FROM THIS ENGAGEMENT WE NURTURE INNOVATION.”

**Michelle ní Dochartaigh-Derbich**



Lethbridge College's equity, diversity and inclusion (EDI) efforts took another step with the announcement of two new appointments and the formation of a new EDI committee. Michelle ní Dochartaigh-Derbich is the college's EDI strategist, a new position made possible by a two-year, \$400,000 EDI Institutional Capacity-Building grant from the Natural Sciences and Engineering Research Council of Canada.

Ní Dochartaigh-Derbich will spearhead the development of an EDI strategy. This work will also be supported by Silvana Campus, who was named to the new position of EDI coordinator.

"As our college and local community grow more diverse, we need to be able to harness that diversity by ensuring equitable access to resources and opportunities and by continuously assessing and improving our climate of inclusion," says ní Dochartaigh-Derbich. "It's through creating a climate of inclusion that we can hear multiple diverse perspectives, lean into individuals' interests and skills and create an engaged workforce. It's from this engagement we nurture innovation."

The college also formed a 15-member formal EDI committee to guide and oversee EDI initiatives at the college. This committee will align with the work of the college's internal self-assessment team, which is evaluating what Lethbridge College is already doing to promote equity, diversity and inclusion, and identify areas in need of improvement. That work is part of the Dimensions pilot program, a national initiative designed to foster transformational change within research bodies and post-secondary institutions. The college was one of just 17 Canadian post-secondary institutions chosen to participate in that pilot.

Michelle ní Dochartaigh-Derbich (left) is the college's new EDI strategist, a position made possible by a two-year, \$400,000 EDI Institutional Capacity-Building grant from the Natural Sciences and Engineering Research Council of Canada. She works closely with Silvana Campus (right), who was named to the new position of EDI coordinator.



## > OUR TEAM: NEW COLLEAGUES



### DR. KSHANAPRAVA DHALSAMANT

Dr. Kshanaprava Dhalsamant has been part of the CARIE team since January 2021, when she joined the team as a post-doctoral fellow researching post-harvest processing of agricultural produce including drying, storage, handling and packaging. Prior to coming to Lethbridge College, she worked as research associate at Rejuvenation Therapeutics for one year, in an industry dedicated to researching herbal medicinal supplements for human health, and at the Indian Institute of Technology in Kharagpur for six months.

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### DR. BRAJESH KUMAR PANDA

Dr. Brajesh Kumar Panda joined CARIE in August 2021 as a post-doctoral fellow with the Advanced Post-Harvest Technology Centre researching grain drying techniques and quality assessment. Prior to coming to Lethbridge College, he worked at the University of South Australia as an academic researcher on projects dealing with table olive processing and non-destructive quality estimation of tree nuts.

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### DR. SHUBHAM SUBROT PANIGRAHI

Dr. Shubham Subrot Panigrahi is researching automated grain storage management techniques for farmers to improve energy efficiency and user-friendliness. He joined the CARIE team in May 2021 after a stint as a manufacturing engineer at Brightlight Agribusiness, in Australia, where he focused on the on-farm management and processing of stored almonds.

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### KRISTINE WILSON

Kristine Wilson worked as a research associate at the Aquaculture Centre of Excellence since October 2020, focusing on aquaponic system support, laboratory work, and data analysis. She was first introduced to aquaponics while volunteering at the aquaponic center at the University of the Virgin Islands in St. Croix. She then returned to Canada and worked for the Government of Alberta under Dr. Nick Savidov's first aquaponic set-up in Brooks.



## ADJUNCT RESEARCHERS

### DR. VALERY DEMBITSKY

Dr. Valery Dembitsky joined Lethbridge College as adjunct research chair at the Aquaculture Centre of Excellence in 2020. From 1991-92, he held a professorship at the Melbourne University in Australia, and from 1993, worked at Hebrew University in Jerusalem.

### DR. ROY GOLSTEYN

Dr. Roy Golsteyn joined the CARIE team as an adjunct senior research scientist with Dr. Sophie Kernéis' Microbiology Research Laboratory in April 2021. His work supports the Antibiotic Alberta Plant Project, which is focused on developing antibiotics from plants found in Alberta (see page 24).

### EWEN LAVOIE

Ewen Lavoie joined Lethbridge College's Spatial Technologies Applied Research and Training (START) Centre as an adjunct research scientist in 2021. His work at Lethbridge College focuses on embodiment and object interactions in real and virtual worlds.

### GURPREET SINGH

Gurpreet Singh has been a sessional instructor in the Lethbridge College Computer Information Technology program since 2018. He joined the Spatial Technologies Applied Research and Training (START) Centre as an adjunct research scientist this year with a focus on integrating machine learning and VR.

**CARIE is also pleased to welcome new members to the college who joined the team this year through Lethbridge College's acquisition of the Lethbridge College Research and Demonstration Farm and the Brooks Research and Production Greenhouse:**

Jim Parker, farm manager  
Mike Ellefson, farm technician  
Ward Henry, farm technician  
Stewart Jangula, greenhouse manager  
Shannon Stewart, greenhouse technician  
John McRobert, greenhouse maintenance assistant



# > OUR TEAM: CENTRE FOR APPLIED RESEARCH, INNOVATION AND ENTREPRENEURSHIP

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# WHAT HAPPENS NEXT MATTERS MOST.

## > 17 GOALS TO TRANSFORM OUR WORLD

The United Nation's Sustainable Development Goals are a call for action by all countries – poor, rich and middle-income – to promote prosperity while protecting the planet. They recognize that ending poverty must go hand-in-hand with strategies that build economic growth and address a range of social needs including education, health, social protection, and job opportunities, while tackling climate change and environmental protection.

As a member in the ImpAct initiative with Colleges and Institutes Canada, Lethbridge College and CARIE engage in campus activities that support the 2030 Agenda for Sustainable Development adopted by Canada and all UN member states in 2015.

LEARN MORE ABOUT THESE GOALS AT: [un.org/sustainabledevelopment](https://un.org/sustainabledevelopment).

### ABOUT THIS PUBLICATION

This is the annual report of work done by Lethbridge College's Centre for Applied Research, Innovation and Entrepreneurship (CARIE). Created by the college's Communications, Marketing and CARIE departments, this publication aims to inform, educate and intrigue readers with stories and photos about Lethbridge College's people and the innovative projects they have underway. For additional copies, email [appliedresearch@lethbridgecollege.ca](mailto:appliedresearch@lethbridgecollege.ca).

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