

GREEN HOUSE

MAN OF THE LAND

WILL PATTISON'S
LEGACY GETS
STUDENTS AND
SCHOLARS INTO
THE FIELD

P. 24

NEW KIDS
ON THE
BLOCK

P.16

Lighting Up
RESEARCHERS'
ROLES EMERGE IN
CANNABIS INDUSTRY

P. 30



FRIENDS
FROM AFAR

AN ALUMNI TRADITION
SHARES HISTORY AND
LOOKS TO THE FUTURE

P. 43



LEADING BY DOING

The newest members of the Faculty of Agricultural, Life and Environmental Sciences are shining examples of the best the faculty has to offer.

“Life is a contact sport.” That was the advice given to me by a wise and successful person who has had a remarkable career at the highest levels of industry, academia and government.

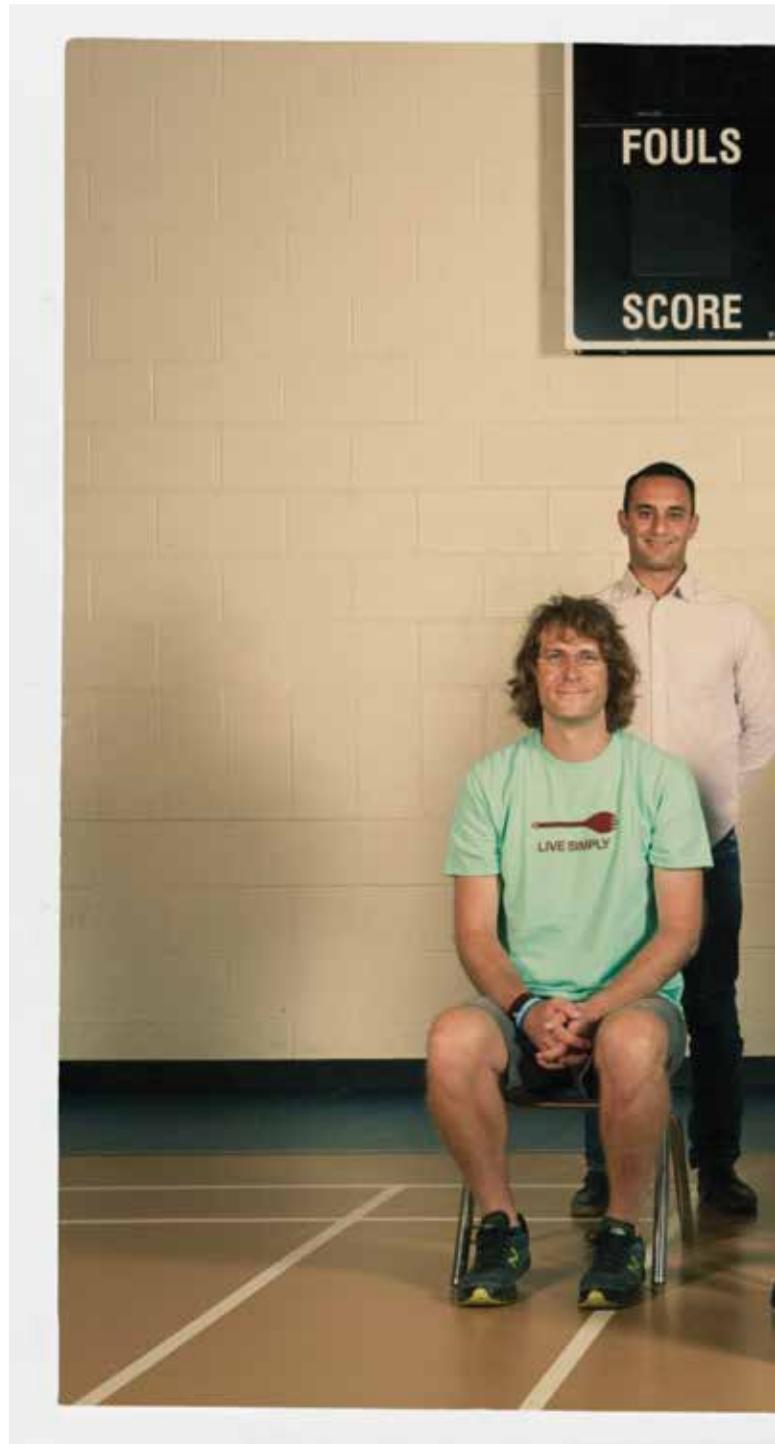
This is not a sports reference nor a call to engage in the martial arts. The pithy phrase highlights the fact that to succeed it is necessary to engage with other people. At our Alumni Weekend Dean’s Breakfast I was asked about the role of a dean. I pointed out that I have 16 different groups that I need to manage to ensure the success of our faculty. In case you are curious, I will provide the categories and you can think about the various groups within each area: students (past, present and future), the faculty, the university, government, other Canadian institutions and agencies, funding agencies, the private sector, non-governmental organizations and our international partners.

At the same breakfast I was asked about faculty accomplishments of which I am most proud. My answer was the wide spectrum of work of my colleagues and their remarkable contributions in teaching, research and connecting to our many partners and supporters. In this issue we highlight some of the newest members of our faculty and the success we know that

they will have in critical areas across ALES. They are featured on page 18.

Our people have been the reason why ALES has made such an impact in our communities near and far over the past 100-plus years. I interact every day with amazing undergraduate and graduate students, dedicated technicians, nimble support staff and administrative experts, insightful faculty members and wise individuals in leadership roles across our faculty. The entire group is characterized by creative

The entire group is characterized by creative thinking and total commitment to the cause of bringing ALES to its highest level of impact.





thinking and total commitment to the cause of bringing ALES to its highest level of impact. It is hard to conceive of a better group to help in achieving these important goals.

When I was a kid, a Canadian steel company used an amazing tagline in their advertising campaigns: “Our product is steel. Our strength is people.” The fact that I remember this phrase 1,000 years later is because of the truth in acknowledging that all successful entities, including ALES,

owe our success to the great people we work beside each day.

Inside these pages, you will learn more about our faculty’s recent accomplishments. Our students’ research is literally out of this world (page 13); faculty are recognized nationally as leaders in their field (page 16) and our alumni are taking a hands-on approach to educating our students outside the classroom (page 26). And, in this issue, we’ve done a deep dive into a controversial industry whose

growth is inevitable. ALES is likely to become an international research powerhouse when marijuana becomes legal in 2018, as you’ll see on page 32.

Thanks for reading—thanks for being a part of the people of this faculty.

Sincerely,

Stan Blade, PhD, P.Ag
Dean, Faculty of Agricultural, Life and Environmental Sciences

Fall 2017

GREEN HOUSE



feature

32

THE COUNTDOWN TO CANNABIS

The burgeoning Alberta industry is positioning ALES researchers and alumni to be ahead of the curve when proposed federal legislation arrives next year.



HAPPENINGS

8

ON-SHIP SCIENCE

Two ALES students take a turn as scientists-in-residence on an Arctic adventure.

12

THAT LOOKS REALLY GOOD ON YOU

Taking a closer look at the need for diversity in women's wear.

15

SESQUICENTENNIAL CELEBRATION

Faculty's volunteer garden is feted for its fundraising contribution to vulnerable women in Rwanda.



Bryce Meyer

feature

22

LEARNING CURVE

Born out of a suggestion from son to father, a small group of innovative Alberta farmers are providing REES students and faculty with a unique in-the-field learning opportunity.

ALUMNI CLUB

41

ALES ACES

Alumni sweep 2017 Alumni Awards.

43

WISDOM OF EXPERIENCE

As the 2018 centennial of home economics and human ecology ramps up, Alumni Weekend's annual Human Ecology Tea brings together familiar faces.

46

IN MEMORIAM

The Faculty of ALES notes with regret the passing of its alumni.

feature

16

BEST IN CLASS

A quick peek at the faculty's newest recruits.



on the cover

Will Pattison photographed in Kingman, AB, by Bryce Meyer



GREENHOUSE

GREENHOUSE is published twice a year by the Faculty of Agricultural, Life & Environmental Sciences. It is distributed to alumni and friends of the faculty.

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Publications Mail Agreement No.
42038516

Return undeliverable

Canadian addresses to:

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▶ **Hi,** whilst staying with Ken Miklos recently, I picked up a copy of *Greenhouse* with the GMO article and as I was involved in developing GMO technologies in the 1990s whilst the director of the Cooperative Research Centre for Legumes In Mediterranean Agriculture, I found the article interesting. The “killer” for us was not developing the GM technology but both access to patents and the regulatory costs associated with variety release. These are still major constraints for minor crops.

However, the factor in *Greenhouse* that really caught my attention was the In Memoriam section and how young many people were included and that there was nobody older than myself (77). Assuming my addition and long division are correct and the sample size is adequate, then average age of death is only 60 years old, much below average life expectancy in Canada. Any explanation?

Kind regards and RIP.

John Hamblin
Institute of Agriculture
University of Western Australia

The average age expectancy in Canada is 82.14 years and is 82.45 years in Australia. We have no explanation for the suggested discrepancy between life expectancy and the median age of our In Memoriam entrants. – ED

▼ We welcome readers to submit letters to:

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Letters should include the writer's full name, address and home telephone number, and may be edited for purposes of clarity and space.

▶ Mr. Editor:

I would be interested in knowing if there is research going on about modifying grasses and broadleaves to be able to take nitrogen from the air.

It would seem that that would be a good way to save on some greenhouse gases and lower costs to producers.

Perhaps your magazine could do an article on it, if it is being researched, and if it isn't, why not.

Yours truly,

John W Elias

Dear Mr. Elias:

*Thank you for your letter. You have identified important research topics—the reduction of greenhouse gases from the atmosphere and agricultural production. While plants by themselves can't remove nitrogen from the atmosphere, microorganisms such as bacteria can. Legume crops, such as peas, naturally work with bacteria to take nitrogen out of the air, making it available to the plant and increasing the plant's productivity. Nitrogen in the form of nitrous oxide is a potent greenhouse gas (almost 300 times stronger than carbon dioxide) and we are currently studying how cattle on pasture can be used to increase the consumption of this gas by bacteria living in the soil, which would remove it from the atmosphere and potentially increase forage production. We hope to have published results in the next year or so, and expect that you'll be able to read about it in *Greenhouse* magazine then.*

Stay tuned!

Best regards,

*Cameron Carlyle, assistant professor
Department of Agricultural,
Food and Nutritional Science
Faculty of Agricultural,
Life and Environmental Sciences*



(Left) McKenzie Kuhn; (Right) Caroline Gibson.

Scientists-in-residence set sail

Forest biology grad students sample methane in ponds, explain research to Arctic voyageurs

BY HELEN METELLA / PHOTOGRAPHY BY ADVENTURE CANADA

The summer job experience that forest biology and management students Carolyn Gibson and McKenzie Kuhn landed in 2017 may be impossible to top in their lifetimes, let alone next summer.

“Every day, every moment, was the most incredible thing we’d ever seen or done,” says Gibson, who with Kuhn, became a scientist-in-residence for an 11-day ocean-going safari through the Arctic’s Northwest Passage.

“We saw narwhals at the mouth of a glacier,” says Kuhn. “The whale expert on board said you’re more likely to get struck by lightning than see one.”

The two earned their posts with the tour-by-ship company Adventure

Canada by proposing a project to engage paying customers in meaningful science discovery.

Travelling up the western coast of Greenland and over the top of Baffin Island to Resolute Bay, they disembarked frequently to sample about 20 ponds for methane and explain the significance of their research to 160 passengers.

“Methane is a very potent greenhouse gas, much like carbon dioxide, but its warming potential (its ability to trap heat in the atmosphere) is up to 36 per cent greater [than CO₂],” says Gibson, who is earning her master’s degree in the Department of Renewable Resources.

“It has been suggested that high Arctic regions are a source of methane, but due to the remoteness and the cost of doing research there, that theory remains unconfirmed.”

The tour company chose Gibson and Kuhn’s project from scores of other applicants to its Young Explorers Program. It allows young scientists to join an on-board staff of researchers, historians and artists who help expedition travellers explore the geography, wildlife and culture of remote areas.

The ship’s guests were enthused by the students’ work, says Brittany Manley, the company’s operations co-ordinator and cruise director.

“Their area of research is of

importance to our passengers, who had many questions on this topic and were happy to see research being conducted," she says. "They are looking forward to reading the results."

For the duo, the trip was an invaluable professional experience. For her PhD thesis, Kuhn is focusing on greenhouse gases from small ponds mainly

located in the Northwest Territories and she hopes the data they collected in the Arctic will provide context.

"The unique thing about this opportunity is that in a short time we were able to go to very diverse settings and sample from very diverse ponds," she says. "On Devon Island, which is a very barren rocky place, those ponds will

be very different from those on tundra, and from the ones I study in the forest.

"Another key piece is that, up to this point, there's been very limited field measurement from these ponds and lakes, so people rely on models and estimates. It's really important to go out there and sample in-person, and compare the models to see how well they are working."

For each of the students, the awe-inspiring natural beauty they viewed, such as the Ilulissat Icefjord in Greenland—a UNESCO World Heritage Site and the outlet of the world's fastest moving glacier—reaffirmed their decision to pursue careers as Arctic scientists.

"This region is important. Whether you are studying cultural, biological, environmental or aquatic environments, they are all tightly linked," says Gibson. "The Arctic is undergoing such rapid change and that change will affect us all in the future." 🍂



Left: McKenzie Kuhn and Caroline Gibson took multiple carbon samples as part of their Arctic research. Below, left and right: Adventure Canada hosted the 11-day Arctic tour.



150,000 REASONS TO SMILE

ALES student one of 10 new Vanier scholars

BY HELEN METELLA

As a child, poultry researcher Sasha van der Klein didn't beg her parents for a puppy, but for pet chickens. Eventually fulfilling her request, her parents put her solidly on the path that has led to a Vanier Scholarship, Canada's most prestigious award for PhD students.

By answering such questions as how long hens who had light controls during rearing look for a nest, how long they sit on the nest and how many eggs they finally produce, she hopes to offer the poultry industry solutions for an array of concerns. These include the high percentage of unusable floor eggs broiler breeders are prone to lay, the poor overall productivity of broiler breeder hens and also how producers can be most efficient with feed.

Vanier Scholarships are worth \$50,000 per year for three years and are difficult to attain because selection criteria includes not just a student's academic excellence and the research potential of their project, but also the leadership the students demonstrate in their community or academic life.

Although van der Klein is an international student who moved from the Netherlands to pursue her PhD at the University of Alberta, she quickly became immersed in assisting with complex student affairs on campus. For the past two years, she has been the vice-president of labour for the Graduate Students' Association, assisting graduate students with compliance issues in their research or teaching-assistant contracts. This year, she will be negotiating a new collective agreement for graduate students at the university.

The Vanier Scholarship definitely relieves some of the many challenges a PhD student must cope with, and that's especially welcome when a thesis project involves responsibility for the welfare of more than 200 chickens, says van der Klein.

"I'm thankful to have a great team and many volunteers who helped me during my experiments, but even then the commitment to being a farmer at the same time as being a student is an intense responsibility." 🍀

Students' education is out of this world

Canadian Space Agency again picks ALES students for prestigious internship

BY HELEN METELLA

For the second year in a row, a top ALES nutrition and food science student is the intern chosen to develop the foods eaten by Canadian astronauts on the International Space Station.

Tanya Mireault, who is in her last year of nutrition and food science, completed a one-year post as the space food and nutrition intern at the Canadian Space Agency this past summer. Taking her place, Hope Kurylo, a fellow undergrad in the same program, started the internship at the agency's headquarters outside of Montreal in September.

The agency chose two ALES students over those from several other institutions because of their broad

education and the work experience in food science and nutrition they accumulated while earning their degrees, says Natalie Hirsch, a project officer in operational space medicine at the Canadian Space Agency.

"They had completed a range of courses in nutrition and food science (with both theoretical and practical components) that are relevant to providing food in space—in particular food safety and quality assurance, and the fundamentals of nutrition," says Hirsch.

For Mireault, the internship was a one-of-a-kind job experience.

"You don't realize how many different moving components are involved in



such a large project as sending astronauts up to the International Space Station, so it's been incredible to see all the small details and the collaboration going on," she says.

"This internship will benefit me greatly in terms of future employment, having a handle on working on such a massive project."

For Kurylo, "it's hard to express how exciting this is. It's amazing to be part of this experience, and I'm looking forward to continuing the work that Tanya started." 🍀



had the most intense problems (adultery, addiction, abuse), and more of them, yet scored highest on hope for their relationship. That group was the smallest and was also the most religious, but it also had the highest divorce rate.

After a year, about half of all the three groups had switched categories, and they didn't necessarily go from soft to serious thinkers, or vice versa. "They bounced around," says Galovan. Some of the serious thinkers had even become non-thinkers.

"It's not like you just think about divorce and do it—you tend to vacillate," says Galovan, who was the chief data analyst of the study, which surveyed a nationally representative group of 3,000 married Americans, ages 25 to 50.

In fact, when the researchers did qualitative, face-to-face interviews with a selection of the soft thinkers, several of those people were actually surprised to be reminded of their survey answer, saying, "I put that down?"

Another intriguing finding in their survey may support those ideas. One of the first questions posed to their sample was whether they had ever thought about divorce. About 30 per cent said yes, but not recently. Of that group, a whopping 90 per cent said they were glad they were still together.

"Given today's society, it's almost impossible not to think about divorce when things are rough," says Galovan. "Because we all know someone who has divorced—and we often hear the somewhat misleading statistic that one in two marriages ends in divorce—it makes divorce seem commonplace."

Instead, this research tells people that thoughts of divorce are far more common than they might realize, that those thoughts are dynamic, and that they can actually help marriages, says Galovan. "Couples can take these thoughts as an invitation to look at their relationship and do what they need to do to improve it." ■

Hit the pause button on your breakup

Thoughts of divorce are common and dynamic, study says, but shouldn't necessarily be acted on.

BY HELEN METELLA / ILLUSTRATION BY SARAH WILKINS

If you're thinking about getting a divorce, give it a year—there's a 50 per cent chance your feelings will change quite dramatically.

That's one of several fascinating discoveries made recently by researchers who looked at what people are thinking when they are considering divorce, and then how they feel a year later.

The study grouped people who were thinking about divorce into three categories: soft, serious and conflicted

thinkers, says Adam Galovan, a family scientist in the Department of Human Ecology, and co-author of a U.S.-based study called the National Divorce Decision-Making Project.

The soft thinkers had infrequent thoughts of divorce and few problems, and were generally hopeful about improving their marriage. The serious thinkers thought about it more frequently, had more serious issues and felt less hopeful. The conflicted thinkers



'CHAOS IN WOMEN'S WEAR'

Students in material culture class pull thread on archaic sizing system

BY BEV BETKOWSKI / PHOTOGRAPHY BY RICHARD SIEMENS

In the frustrating quest of clothes shopping, women are quick to blame themselves when trying something on for size. But the real culprit is the garment, says a University of Alberta fashion expert.

"There is chaos in women's wear," said Anne Bissonnette, a material culture professor in the Department of Human Ecology. "The whole system is problematic, and women don't know that the problem is not them."

Developed in 1939–40 by the American Bureau of Home Economics in the first science-based study of its kind, the current sizing system has been tweaked over the years, but not really changed. Originally, the study suggested adopting a range of options that already existed in menswear, but they never caught on for women's clothing.

"Industry dress forms still mimic the high, pointed bust, flattened stomach,

reduced hips and militaristic shoulders shaped from bygone bras, girdles and shoulder pads," says Josée Chartrand, a master's student who co-curated a recent exhibit with Bissonnette called *Misfits: Bodies, Dress and Sustainability*. "It doesn't reflect female forms of today."

Off-the-rack sizes don't take into account the many factors that shape the modern body, like genetics, nutrition, lifestyle (think desk jobs), changes in weight and aging bodies. As a result, sizing standards ignore a crucial factor: diversity.

"We are all deviant, there is no one standard size. Body shapes are different on a global scale," says Bissonnette, who notes how sizes can vary drastically among different countries. "What works on a typical fit model in Asia may not be what fits someone in Africa or North America."

"For people who don't like shopping

or have less confidence, the last place they want to be is in a store, because they can't find clothing that fits them."

And it's not about vanity, Chartrand added. "Having good-fitting clothing is not superficial, it creates the impression of who you are. It's not vain to want clothing you are comfortable in and look good in."

While petite sizes, plus sizes and more recent features, like elasticized tummy control panels, have evolved to offer more choice to the flummoxed female shopper, they are still just band-aids, Chartrand argued.

"They don't change your figure drastically and they don't accommodate the body as it changes. And the gap between sizes dooms everyone who doesn't fit precisely into what's available."

Clothing manufacturers should instead scrap the old sizing system and tap into current research, using

3D body scanners—similar to the kind used in airports—to understand how real bodies occupy space, Bissonnette suggests. In fact, a movement is underway using modern technology to survey Americans and Canadians on accurate sizing and create a wider database to better design clothing and vehicles.

New labelling systems need to account for body types, and listing factual measurements in garment tags can mean more figure-friendly designs, Bissonnette says.

“The standard should, in fact, be several standards for varying body types, heights and weights. That’s the key.”

And, she adds, it should be a global system, so people can find garments that fit them in any country—an idea she thinks is sensible for modern immigration trends and manufacturing practices.



“No one wants to stand out as accommodating ‘deviant’ bodies, because that forces their customers to identify themselves that way,” Chartrand says.

Ultimately, that means a lot of perfectly good clothing eventually makes its way to landfills.

“In the long run, better design

and labelling would pay off in terms of consumer satisfaction and sustainability, because buyers would walk away from the fitting room happier than they are now, and might hold onto their purchases longer,” Bissonnette says.

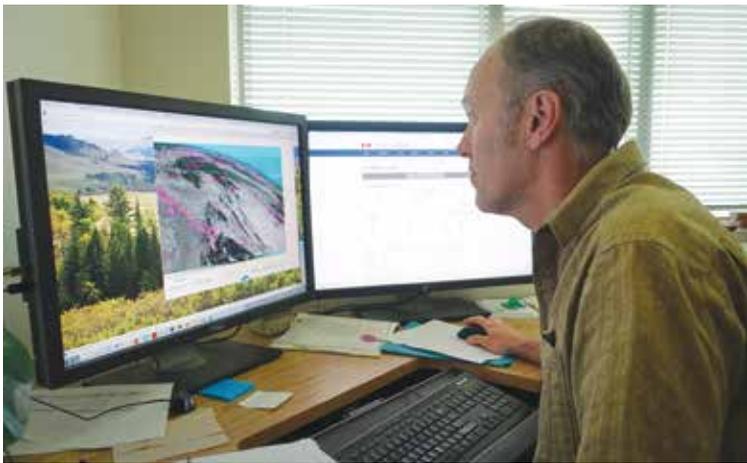
“If we are going to buy less, we need to get more from our garments.”



A SIGN OF THE TIMES

Artificial intelligence tool could help predict major forest fires

BY HELEN METELLA



Using a computer model that imitates the way a human brain learns, wildfire scientist Mike Flannigan has co-created a new early warning system for predicting the most destructive forest fires.

The tool is loaded with more than five decades of historic weather data already in its “brain.” When real-time information on atmospheric conditions is input, it finds patterns and identifies complex relationships that it updates constantly. Then it employs self-organizing maps (a software tool for visualizing high-dimensional data) to predict where the most extreme fires are likely to occur, based on space and time-related factors as well as intensity and growth rate.

“Fires need fuel, ignition and hot, dry, windy weather,” says Flannigan, director of the Canadian Partnership for Wildland Fire Science in the Department of Renewable Resources. “Of those, weather is the biggest factor affecting how dangerous the fire will be.”

Due to changes in climate, forest fires are raging longer and stronger, so improving how accurately and quickly fire managers can assess the threat could help us adapt to that reality, says Flannigan.

The computational model was developed over the past three years with scientists from the University of Oklahoma. The next step is to test it in the field.

“This tool lets us know there’s extreme weather coming, where it will occur and how extreme it will be,” says Flannigan. “That could allow us to get the right fire-fighting resources to the right places.”



Canada 150 recognition

One of the faculty’s favourite community engagement endeavours—the Green and Gold Community Garden—received national recognition in October when it was recognized with a Senate of Canada 150 Medal, which commemorates the first sitting of the Senate in 1867. Senator Grant Mitchell selected the garden because of its “remarkable efforts that benefit the local community and the Tubahumurize Women’s Association in such a meaningful way.”

UNCOVERING EARTHLY MYSTERY

Study funded by federal Discovery Grant helps restore forests

BY MICHAEL BROWN

The mighty aspen is on the run.

The southern part of the aspen's range from the northernmost reaches of Canada to the highest altitudes in Mexico is drying up—while the northern edges are warming up and thus becoming more conducive to the tree's survival.

This is because of climate change, says Justine Karst, the NSERC Industrial Research Chair in Terrestrial Restoration Ecology, but the bigger questions surround what then happens to one of nature's unheralded carbon sink champions and a plant's best friend—the mysterious mycorrhizal fungi.

According to Karst, mycorrhizal fungi—which come in two types, arbuscular and ectomycorrhizal—colonize the fine root tips of just about every tree and plant on Earth.

In a symbiotic ballet from which life as we know it is allowed to spring, these mycorrhizal fungi grow tiny branch-like hypha (filaments) into the soil to break down organic matter in a way that roots can't, taking up nutrients and essentially feeding the plant.

Researchers believe that up to 50 per cent of carbon in soils is derived from mycorrhizal fungi.

Karst says she chose to study the

aspen because of its wide range and the fact it is the rare species of tree that hosts both ectomycorrhizal and arbuscular mycorrhizal fungi. Because they differ in size and carbon-cycling rates—the larger ectomycorrhizal fungi requires more carbon and leaks more carbon into the soil—she thinks she will be able to determine what is happening to the ecosystem as aspens are stressed and then are lost.

“When you think of the health of the forest, its resiliency and productivity and how it is going to function in the future, we need to recognize that these small things matter,” she says.

To support this research, Karst and 160 other UAlberta research, post-graduate and postdoctoral fellows' projects across multiple natural sciences and engineering fields recently received \$26.1 million in fundamental research funding through the Natural Sciences and Engineering Research Council (NSERC) Discovery Grants program. 🍄



Marc Frey

FOULS T.O.L. PLAYER

SCORE

MATC

HEADS *of their* CLASS

*ALES welcomes
talented new group of
scientists to the faculty*

WHEN IT CAME time to gather the newest members of the Faculty of Agricultural, Life and Environmental Sciences for a “class photo”, we noticed something they all have in common: They all seem to really, really like the faculty.

(And they were all up for a bit of creative fun with the photo shoot, so thanks! – Ed.)

Regardless of their areas of expertise, their origins or their time (so far) in the faculty, our newest hires are enthusiastic, talented and eager to leverage the great scientific minds of their colleagues.

Welcome to the family!

Photography by Aaron Pedersen

Faculty of Agri
Life & Environmen
2017-20



FOUL T.O.L. FOULS

H SCORE

Cultural,
Mental Sciences
2018



“This is the best environment in Canada to perform the kind of research I want to do.”

– Caroline Richard

NAME, DEPARTMENT AND START DATE:

CAROLINE RICHARD

Department of Agricultural,
Food and Nutritional Science

JANUARY 2017

AREA OF RESEARCH:

Nutritional immunology. Specifically, how nutrition can ameliorate the immune dysfunction associated with obesity and chronic diseases, especially Type 2 diabetes.

WHY DID YOU CHOOSE ALES?

Because of the expertise and state-of-the-art facilities that ALES possesses, including the Human Nutrition Research Unit in the Li Ka Shing Centre for Research Innovation. These facilities offer unique (and centralized) techniques and approaches including a metabolic kitchen for feeding trials, equipment to assess whole-body energy metabolism and body composition and core facilities for flow cytometry and cell imaging. Research groups affiliated with ALES bring a variety of complementary expertise for fruitful collaborations. This is the best environment in Canada to perform the kind of research I want to do.

WHAT'S THE MAIN THING YOU HOPE TO ACHIEVE DURING YOUR TIME IN ALES?

From my research side, I would like to come up with clear nutritional recommendations to improve the immune system in individuals with obesity and chronic diseases. Regarding the teaching part, I would like to get the future generation of dietitians more interested in doing graduate studies. I believe that having a master's degree is an asset for all dietitians even for those working in clinic. Critical thinking and know-how to search the scientific literature to solve problems are important skills that dietitians can apply in their practice.

IF YOU COULD MAKE ONE RULE THAT EVERYONE HAD TO FOLLOW, WHAT RULE WOULD YOU MAKE?

Work and collaborate together (help each other/teamwork). As a new assistant professor, I received a lot of support and advice from my colleagues, which really help me in developing a novel research program. I believe we can all learn a great deal from each other.



NAME, DEPARTMENT AND START DATE:

GUANQUN (GAVIN) CHEN

Department of Agricultural, Food & Nutritional Science
MAY 2017

AREA OF RESEARCH:

The long-term goal of my research program is to increase our understanding of plant oil formation and develop biotechnological strategies for increasing the oil content of biomass and generating designer oils for better health and industrial applications.

WHY DID YOU CHOOSE ALES?

ALES and AFNS offers an ideal multidisciplinary environment for my research. I like the collegial and highly supportive culture here. I have access to all the infrastructure necessary and get strong support from my mentor, my colleagues, AFNS and ALES.

I was provided with a good laboratory space and equipment dedicated to lipid / oilseed biotechnology and related activities. ALES is an ideal environment for me to do my favorite research.

WHAT COULD YOU GIVE A 30-MINUTE PRESENTATION ON WITH ABSOLUTELY NO PREPARATION?

I like political news in Hong Kong and Taiwan. I can easily give a 30-minute presentation on related topics with absolutely no preparation. It is far away from plant lipid biotechnology, but it can easily put someone to sleep (e.g. my wife).
Insomnia? Come see me.

“Insomnia?
Come see me.”
– Gavin Chen

AREA OF RESEARCH:

Developing novel technologies to improve food/water safety and security.

WHY DID YOU CHOOSE ALES?

There are several reasons. Agriculture is very strong in Alberta. The agriculture and food processing industries represent the second-largest manufacturing sector in the province. ALES boasts outstanding faculty members of international reputation and extensive research facilities and infrastructure with great support for faculty, internally and externally. I chose ALES because I believe my program can help not only the agriculture and food industry in Alberta, but also the agrifood sector overall.

WHAT'S THE MAIN THING YOU HOPE TO ACHIEVE DURING YOUR TIME IN ALES?

I hope to develop my research and teaching program at the University of Alberta by working on some unique areas to address important questions related to food safety and security by collaborating with faculty members of ALES.

WHAT DO YOU MISS FROM WHERE YOU CAME?

I grew up in Kerala, India. Personally, I miss several events like local festivals and gatherings.



NAME, DEPARTMENT AND START DATE:

ROOPESH SYAMALADEVI MOHANDAS

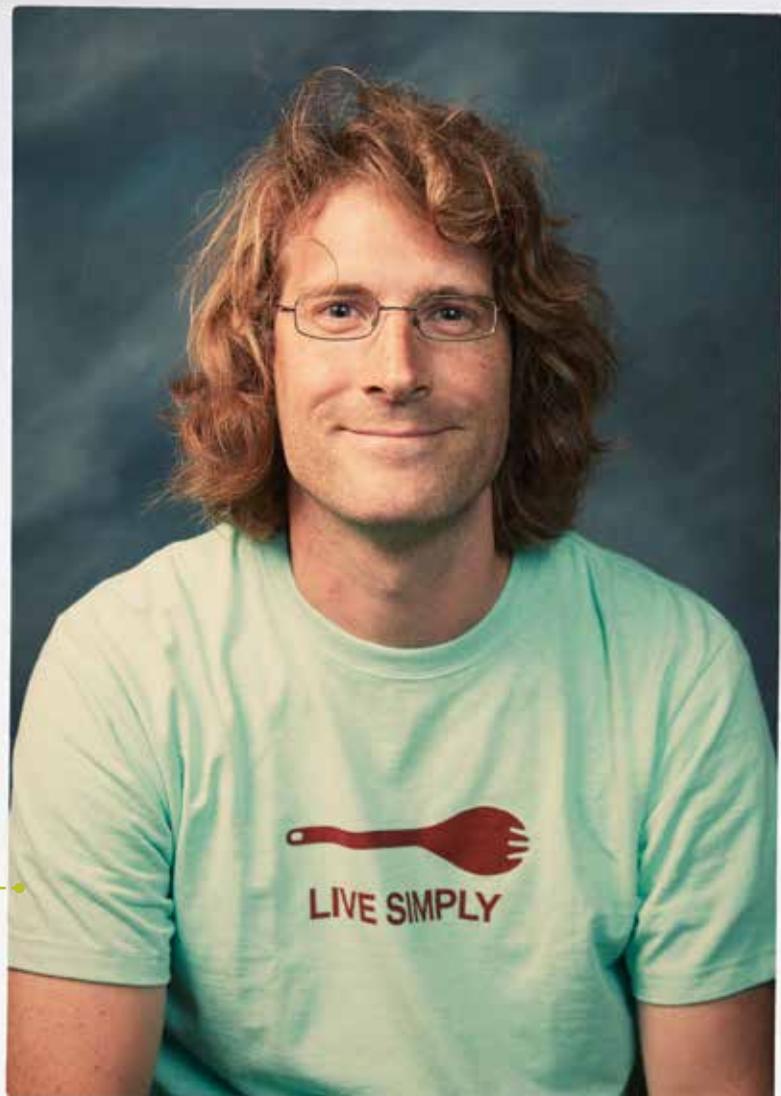
Department of Agricultural, Food and Nutritional Science
JANUARY 2016

“Being a researcher means being creative—and working with some of the best researchers in the country is freaking awesome.” – Maik Kecinski

NAME, DEPARTMENT AND START DATE:

MAIK KECINSKI

Department of Resource Economics
and Environmental Sociology
SEPTEMBER 2016



AREA OF RESEARCH:

Experimental economics of contamination, climate change, risk, water reuse, environmental justice, northern and Indigenous issues and land conservation.

WHY DID YOU CHOOSE ALES?

At least three reasons: (1) The department seemed and actually is incredibly friendly and collegial—people legitimately care; (2) REES is probably the best environmental economics department in the country and I believe that I will be inspired by my colleagues to be the best I can

be here—being a researcher means being creative and working with some of the best researchers in the country is inspiring and freaking awesome; (3) My position came with an incredible amount of freedom to work on the issues and questions I am interested in and want to explore.

WHAT'S THE MAIN THING YOU HOPE TO ACHIEVE DURING YOUR TIME IN ALES?

I want my work to have an impact ... for the better.

NAME, DEPARTMENT AND START DATE:

XIAOLI FAN

Department of Resource Economics and
Environmental Sociology
AUGUST 2017

AREA OF RESEARCH:

Agricultural and food business management.

WHY DID YOU CHOOSE ALES?

ALES is one of the best agricultural economics
research faculties in the world.

**WHAT'S THE MAIN THING YOU HOPE TO
ACHIEVE DURING YOUR TIME IN ALES?**

I want to contribute to ALES's tradition of producing
high-quality research and teaching.

**WHAT'S THE BEST PIECE OF ADVICE YOU'VE
EVER RECEIVED?**

"The key to success is to keep stepping out of your
comfort zone."



NAME, DEPARTMENT AND START DATE:

MOHAMMAD TORSHIZI

Department of Resource Economics
and Environmental Sociology
AUGUST 2016



AREA OF RESEARCH:

Economics of innovation, grain transportation, agricultural and
food business management.

WHY DID YOU CHOOSE ALES?

ALES teaching and research programs focus on a variety of
issues. Working alongside the students and the faculty members
at ALES allows me to broaden my perspectives and deepen
my understanding of some of the issues that are key to the
prosperity of the current and future generations in Canada and
across the world.

**WHAT'S THE MAIN THING YOU HOPE TO ACHIEVE
DURING YOUR TIME IN ALES?**

I think many people choose academia because they want to
make this world a better place to live. I, too, would like to
influence this world in a positive way through my research and
teaching. I hope that my research can help remove economic
inefficiencies and make some people's lives a bit better. I also
hope that my students can create a positive impact in the
society.

**WHO HAS IMPRESSED YOU MOST WITH WHAT
THEY'VE ACCOMPLISHED?**

(REES) Professor Terry Veeman is one the most accomplished
agricultural economists in the world. Yet, he is one of the most
humble people I have ever met.

NAME, DEPARTMENT AND START DATE:

JEN BEVERLY

Department of Renewable Resources
JANUARY 2017

AREA OF RESEARCH:

Wildland fire.

WHY DID YOU CHOOSE ALES?

The quality of the people and the research being done here was a key factor that drew me to ALES.

WHAT'S THE MAIN THING YOU HOPE TO ACHIEVE DURING YOUR TIME IN ALES?

I hope to inspire students to pursue studies and careers in the field of wildfire science and management.

WHAT IS SOMETHING YOU THINK EVERYONE SHOULD DO AT LEAST ONCE IN THEIR LIVES?

Take a temporary break from their profession to do something entirely different. It's a great way to get perspective on the importance and value of your work.



NAME, DEPARTMENT AND START DATE:

JUSTINE KARST

Department of Renewable Resources
JANUARY 2016

AREA OF RESEARCH:

Mycorrhizal ecology of disturbed, restored and intact forest ecosystems

WHY DID YOU CHOOSE ALES?

I am a graduate of ALES '99 BSc (Env/ConSci). As an undergrad, there were exceptional faculty who encouraged me to do research and consider graduate studies. Not only do I get to work alongside many of those same faculty today, but I also get the opportunity to give back to the ALES community.

WHAT'S THE MAIN THING YOU HOPE TO ACHIEVE DURING YOUR TIME IN ALES?

Help students discover their inner scientist.

WHAT BOOK TITLE BEST DESCRIBES YOU?

I am a combination of two book titles: *Grit, The Power of Passion and Perseverance*, by Angela Duckworth and *State of Wonder*, by Ann Patchett.





“I want to improve people’s lives with better protective clothing.” – Patricia Dolez

NAME, DEPARTMENT AND START DATE:

PATRICIA DOLEZ

Department of Human Ecology

JULY 2017

AREA OF RESEARCH:

I am interested in developing protective clothing against mechanical, chemical, and thermal hazards, with a special focus on materials aging, nanotechnologies, smart materials, natural fibres and materials recycling.

WHY DID YOU CHOOSE ALES?

It allows me to get back to my first love in terms of research and protective clothing. In addition, I really like the multidisciplinary nature of the Department of Human Ecology; I hope it will help me bring together science and engineering (I am also an engineer) and aspects related to people’s well-being in my research.

WHAT’S THE MAIN THING YOU HOPE TO ACHIEVE DURING YOUR TIME IN ALES?

I want to improve people’s lives with better protective clothing and transmit that passion for textiles and textile research to the new generation.

WHAT WAS THE BEST BOOK OR SERIES THAT YOU’VE EVER READ?

I am a subscriber of *National Geographic* since 2002 (My collection goes back to the end of the ’60s). I like to see how things have evolved over the years, or sometimes remain the same.

tour triumphs

Recognizing that providing academics and students access to farming practices can be a challenge, one local farming community has stepped up in a big way.

By Cait Wills



Jean Heie and Marion Pattison share an easy camaraderie of years of friendship. They work in tandem as they lay out a coffee service in the Kingman Community Hall ahead of the planned annual visit of students and faculty from the Department of Resource Economics and Environmental Sociology (REES).

Marion and Jean are part of the fabric of the community, as is the Kingman Marketing Club. It is this group that offers these annual tours, and has for the last decade.

It was about that same time that Jean was widowed. Her then-14-year-old son, Rob, was years from taking over responsibility of the farm, so she relied on the support of the marketing club, where her husband, Don, had been a founding member. “Access to this group of farmers was invaluable,” she says.

Thanks in part to her husband’s dedication to the well-established farm as a legacy for their children, Jean adeptly managed the family business and encouraged her son to attend the marketing group meetings after he graduated from university, returned home and prepared to take up the reins of the family’s 103-year-old property. “He initially thought it was just a bunch of older farmers sitting around visiting,” she laughs. “But he learned pretty quickly that they were an important source of practical knowledge and experience.

“A university education develops your ability to more quickly sort through and understand information, but it cannot replace knowledge gained from years of experience.”

One could be forgiven for thinking this group, which came into being about 30 years ago, is a casual affair. There is no membership—“we don’t have a secretary and we don’t have a



Above: Kingman tour organizers Jean Heie (left) and Marion Pattison.
Below: Left, the annual tour in July 2017; Right, Kingman tour organizer Will Pattison.





Farmer Rob Heie stands in a field that, for the first time in over a century, was not able to be harvested because of weather.

bank account”—says tour organizer and long-time member Will Pattison, '67 BA, '70 MSc (REES). But this gang of about 25 people has spent the last three decades researching crop prices, gaining experience in innovative farming methods and sharing information, with profound results for those who have dedicated their lives to resource economics, but who may have never run their hands over the crops they study.

“This tour allows students and faculty to understand more fully how farmers cope with risks and uncertainties in

production decisions,” says Peter Boxall, chair of department.

“In addition, fomenting relationships between the Kingman Marketing Club and the department in many cases provides opportunities for researchers to test ideas, pre-test experimental procedures and have some reality injected into the development of questionnaires and interview guides that will be used in research projects.”

Case in point: the Kingman producers provided invaluable input into Boxall’s recent research on wetland conservation

"I think there's something to this climate change."



and economic experiments on reverse auctions.

"One could argue that the research was successful because it was pre-tested with actual producers," he says.

In Kingman, which has a population of about 150 in its 10 square blocks, word travels fast of the tour group from the city. The community hall, which has a capacity of just over 300, seems to fill as the charter bus disgorges its passengers from Edmonton. Before the guests arrived, the chairs in the hall were pulled into a circle, and the marketing group passed the time

with family, friends and community members drawn to the day-long tour. By the time Will has invited everyone to match up and get going, there were close to 50 people talking, laughing and gulping the last of their cobbler before, indeed, getting going.

"There's a pretty big divide between the man on the land and the institution, particularly when you get past the undergraduate area," says Pattison, whose son, John, introduced the idea of offering annual tours to members of the department when he was a member of the Graduate Students' Association in the Department of REES. "As farmers, we don't have a lot of contact with the academic community, and it has felt that some of them don't have any contact with farmers, so this helps us with understanding international research, marketing and resource economics, specifically.

"The need for an academic to be rooted in the land—whether forests, water, grain or cattle—is necessary for academic success."

The first tour is to a crop owned by the Heie family. Son Rob explains how the field was too wet to harvest in the fall, and too wet to harvest in the spring. By August, when the tour is underway, the ground still has a squelch to it that seeps moisture around a boot's imprint in the soil. Rob explains that this is the first time in the family's more than a century of land ownership that they've had to leave a crop in the field.

"I think there's something to this climate change," he says. It's hard to tell if he's joking, but when Fred Niehoff spoke back at the community hall, he asked for audience feedback on challenges to farming in the area. "Weather!" was the first and very loud response.

Stop two is a gorgeous field of canola, seeded "very late" because of wet fields, says Joel Boettger. He and his father Don, also on the tour, have planted wheat as well, although Joel explains that they applied a growth inhibitor on this field this year, as the particular variety has sometimes lodged badly. This initiates an earnest conversation between the

"We have the idea that five heads are better than one."

- Will Pattison '67 BAg, '70 Msc (REES)



This page: **Top left**, visiting scholars to the Department of Resource Economics and Environmental Sociology examine a canola field in bloom; **Top right**, canola seeds; **Left**, Don Boettger shows where clubroot would take root on a canola plant. This root shows no sign of clubroot.

Opposite page: **Top**, farmers examine wheat for fungus. It is clean; **Bottom left**, quinoa in flower; **Bottom right**, department chair Peter Boxall discusses the merits of quinoa with visiting scholars.

farmers about the types of treatment for such an affliction, while Don shows the students canola pulled out at the stalk and points out where its scourge, soil-borne clubroot, would reside. (Thankfully, there is no clubroot to be found in this field.) The students and scholars are mesmerized by the acid yellow blossoms of the canola.

“Compared to China, per capita arable land [in Canada] is very large,” said Wenjing Zhu, a visiting scholar from Jiangsu Province, China. The agriculture engineer and his wife, Xiaofeng Ren, a food scientist at Jiangsu University, are particularly interested in the crops being grown in Alberta. “Since my research focuses on greenhouse crops, [my local] planting patterns are not particularly useful for my specific research work,” says Zhu. “On the Kingman farm tour, I saw the farmers’ serious and responsible work attitude and careful consideration of environmental conditions.”

Next, it’s onward to a field of peas.

Fred Niehoff, a farm manager originally from Germany, shares that both fields bordering the dirt road where the tour is stopped are planted with, on the right, green peas; the left, wheat. His presentation becomes a fascinating tableau when he and his fellow marketing group members start talking about perceptions of the public on the use of pesticides. “People have to understand that we have families,” says Niehoff. “We would never do anything to hurt them or jeopardize their health, so of course we care very much what we put on our crops!”

He is visibly hurt by the suggestion that the crops he manages for a member of the marketing club are not tended with love and care, and the circle of farmers with him murmur agreement. Two of the group step away from the others and wander into the field of wheat. “Just checking for fungus!” they call out. Satisfied with the wheat’s pristine condition, the tour moves on to the last stop.

Quinoa.

The visiting scholars, two from China and one from Mongolia, are astonished when Peter Boxall explains to them that quinoa, an ancient grain grown in the Andes Mountains, is flourishing here in Kingman’s fields.

Yes, but only recently.

This is the first attempt to grow quinoa in this area, says Pattison. “It’s got its challenges, just like canola,” he says, explaining that, when he was completing his undergraduate degree in agriculture in 1967, canola was considered an experimental crop. “Farmers said it would never pick up,” he laughs. “If I’m tempted to dismiss a new crop variety, I think of that,” says the 76-year-old.

As the tour concludes, the guests of the Kingman Marketing Group return to the community hall for an informal inspection of the gleaming John Deere and Case equipment parked in the field next door, a barbecue dinner and one last chance to ask questions of the collective 500 years’ experience represented by this group. Then, it’s back to Edmonton to digest what’s been shared so that it can be applied to learning, teaching and research. ♣





GROW

OPPS

BLUNTLY SPEAKING, ALES SCIENTISTS MIGHT BE CANNABIS INDUSTRY'S BEST BUDS

BY HELEN METELLA

PHOTOGRAPHY BY LAUGHING DOG PHOTOGRAPHY

In the classic film *The Graduate*, the lead character gets one word of advice on which hot new field to enter: “Plastics,” he’s told in 1967, on the cusp of a revolution in consumer goods and manufacturing.

Today the prophetic word with potential to overhaul the same markets is ... cannabis.

Pioneering activity is underway and building steadily in Alberta for two quite different products derived from the plant *Cannabis sativa*: marijuana and industrial hemp.

For agronomists, food scientists, nutritionists, textile researchers and resource economists—all of whom the Faculty of Agricultural, Life and Environmental Sciences trains expertly—opportunities abound to pursue innovative science associated with the development of both substances.

Given the potential dangers to public health and societal norms posed by commercialization of marijuana, there may be important roles, too, for family and community researchers, also trained by the Faculty ALES in its Department of Human Ecology.

“It’s the role of groups like ourselves, with the expertise to work with these potential partners, to ensure they don’t get

lost in the promise of specialized products, but are rooted in the science and practicalities and the issues that all agricultural products face,” says Stan Blade, dean of the faculty.

“If we get this right, if we are trusted sources of these commodities, just as Canada has been a supplier of wheat, barley, and canola to the world, there’s no reason why Canada can’t play a role as that good actor internationally.”

The spotlight on cannabis plants has intensified this year, partly because the Canadian government has promised to make recreational marijuana legal by July 2018. That will likely increase customers in a country that Health Canada said in June already has the highest cannabis-use rates in the world.

Other factors are also converging.

Canada leads the world in production of medical marijuana. Yet in July, the vice-president of Aurora Cannabis, a medical marijuana producer already established in southern Alberta, which is erecting a massive new facility at the Edmonton International Airport, said that expected demand in the rapidly growing medical cannabis market is exceeding envisioned production.

“When the demand of the adult consumer system is



layered on top of that, it's a rush to build as much capacity as possible," Cam Battley told the Canadian Press.

ALES alumni are already feeling demand for their expertise. Jim Hole, horticulturist and co-owner of Holes Greenhouses, has fielded multiple proposals this year. In October, he became director of cultivation for Atlas Growers, a medical marijuana operation under construction near Lac St. Anne that anticipates being licensed in early 2018.

On the hemp side, with more than 30,000 acres dedicated to industrial hemp, Alberta grows the most of any jurisdiction in North America, mostly in southern Alberta. Now there is an explosion of interest in Brazeau County, an area that's motivated to expand the industry. The county is located 150 km southwest of Edmonton, in Alberta's Pembina oil fields, and is economically depressed by the downturn in oil and natural gas.

In Drayton Valley, BioComposites Group's \$17-million plant has begun commercial production of hemp-based mats that prevent soil erosion and suppress weeds; it has completed product development of hemp-based vehicle door panels for the auto industry and is developing other products, including hemp construction blocks. Sunstrand, a Kentucky company that is the only major decorticator (separator) of fibres such as hemp in the United States, is opening a factory between Calgary and Edmonton in early 2018. Hempco, the third largest of Canada's six producers of hemp seed as food, will open a processing plant in nearby Nisku in 2018 that is almost three times the size of its flagship Manitoba plant.

"I look at hemp as a tri-crop," says Charles Holmes, CEO of Hempco. "It's a food, fibre and medicine. Compared to anything else you can grow on Earth, the value is incomparable."

Yet for hemp to fulfil its potential, scientists must bridge important gaps in knowledge. For instance, north and central Alberta are poor places to grow hemp for its seeds, said Jan Slaski, a crop and plant physiologist with InnoTech Alberta, a research and testing facility where he has studied hemp for 16 years. There's too much precipitation and more daylight hours there than in the south. Hemp is a "short-day plant"; it begins to flower as days shorten.

The north has an advantage growing hemp for fibre, said Slaski, who says the same hemp variety produces 20 to 30 per



"Industrial hemp is a huge industry that could easily be developed here in Alberta."

Dan Madlung, CEO of BioComposites Group, to Alberta grain farmers contemplating industrial hemp as a crop, during a tour of his facility in August 2017

cent more fibre in the Peace Country than near Lethbridge.

"There's lots of opportunities for hemp but they have to be revealed by research," he says.

To advance the sector, "it's key to develop new applications and products, and most importantly, establish markets and supply chains," says John Wolodko, the Alberta Innovates Chair in Bio and Industrial Materials in the Department of Agricultural, Food and Nutritional Science.

Wolodko studied hemp extensively as a replacement for fiberglass during his previous position with the Alberta Research Council (now InnoTech Alberta) and has several projects planned for 2018 to improve the processing and quality of hemp biomass for industrial use.

He believes that researchers in Alberta have an advantage as the industry sparks up because of the many lessons learned here while establishing the canola industry, an era clearly remembered by Blade, who grew up on a family farm that adopted canola early on. The lessons ran the gamut, says Blade.

"It didn't fit into our cropping systems, the plants were too late. It didn't stand very well. The whole production model was not well understood. The whole processing piece was new. We needed to have oil crushers, which was outside of our expertise."

Yet with the assistance of scientists in the Faculty of ALES, who developed regionally adapted varieties and cultivars that resisted disease, the fledgling canola industry flourished.

"It was effectively a non-industry until the 1970s," says Wolodko. "Now it's an anchor industry in Alberta."

HOW DID WE GET HERE? A MEDICAL MARIJUANA TIMELINE

1999

Legal access to dried marijuana for medical purposes through exemptions under Controlled Drugs and Substances Act (CDSA) is approved.



2000

A LOWER COURT DECISION SAYS PEOPLE WITH MEDICAL NEED HAVE THE RIGHT TO POSSESS MARIJUANA.

2001

Marijuana Medical Access Regulations (MMAR) allow people with medical needs to access, with authorization of a doctor, dried marijuana by producing their own plants, designating someone to grow them for them or by accessing Health Canada's supply.

2013

AFTER SEVERAL COURT-DRIVEN CHANGES TO MMAR, THE GOVERNMENT PASSES MARIJUANA FOR MEDICAL PURPOSES REGULATIONS (MMPR), CREATING RULES FOR A COMMERCIAL INDUSTRY TO PRODUCE AND DISTRIBUTE MEDICAL MARIJUANA.

WHY SCIENTISTS ARE NEEDED NOW

MEDICAL AND RECREATIONAL MARIJUANA

“I’ve heard all kinds of crazy things (on how to grow medical marijuana), like ‘I scrape the seaweed off the beach in Nanaimo to use for fertilizer,’ or, ‘I use egg shells and snails,’” says Sheldon Croome, president of Atlas Growers Ltd., a late-stage Alberta applicant for a medical marijuana facility going up north of Lac St. Anne.

“People have developed their own ideas of how to grow it, but there’s very little credible science that demonstrates how best to grow cannabis,” says Croome, an alumnus of the University of Alberta’s School of Business.

Yet every entrant to the medical marijuana industry requires credible scientific support to successfully navigate all the stages of licensing, let alone the ongoing business.

As of October 2017, there were four licensed medical marijuana producers in Alberta, and at least four more in late-stage application (see page 36). “Late-stage” means that facilities are currently under construction but not yet approved by Health Canada. Only after the federal agency signs off on the completed facility where applicants plan to grow medical marijuana—it must emit zero odour and be stringently secured, among other criteria—will the company be licensed to plant seeds. Then, before producers get a license to sell the final product, mature plants must pass quality and standardization inspection.

Experienced plant scientists such as ALES alumnus Jim Hole are therefore essential. As Atlas Growers’ new director of cultivation, Hole will provide advice and training on the cultivation of the plants. That includes instruction on the best nutrient concentrations, grow media, irrigation and lighting, and the optimum heating, cooling and humidity methods.

In addition, says Croome, “We also need staff to manage quality assurance and product testing, which allows us to

ensure the cannabis is clean and free of contaminants.”

Those fundamentals aside, there are countless other scientifically sound details vital for success in what will be a vigorously competitive field, says Hole.

“How can I grow efficiently, how can I get the best cultivar, the best disease resistance? There’s the plant pathology side. Then there are the plant breeding efforts. What do you extract to get the components we need? All these different things will require people with excellent skill sets to ensure we have the very best product coming out.”

Atlas and other medical marijuana facilities also hope, pending a change in the law, to use the plants’ leaf matter for their cannabidiol (a compound believed to have health benefits for nausea, inflammation and pain, as well as mental disorders) to market as CBD pills and extracts, opening opportunities for plant microbiologists.

“We’ll need the lab to tell us what these plants are producing in the way of cannabinoids and THC and other compounds,” says Hole. “Which ones are producing the most?”

Already, Croome is consulting with Reed Myers, a PhD candidate researching marine sediment science in the Department of Earth Sciences. Since many fertilizers are based on marine organisms, he plans to work with Croome on fertilizers, root zones and growing methods for cannabis. More university collaborations are inevitable, says Croome, because science will add innovation and credibility to a startup industry that is receiving articulate criticisms for its environmental footprint and potentially adverse health effects.

“It’s important to break those stigmas by proving science and research can bring credibility to the implied medical benefits, while also advancing and innovating within the agricultural industry,” he says.

2015

The Supreme Court says restricting access to only dried marijuana is unconstitutional, so government allows producers to also produce and sell cannabis oil, fresh buds and leaves.

2016

Federal Court says requiring people to acquire marijuana from only licensed producers violates the Canadian Charter of Rights and Freedoms.

2016

ACCESS TO CANNABIS FOR MEDICAL PURPOSES REGULATIONS (ACMPR) SAYS PEOPLE WITH MEDICAL NEEDS CAN NOW ACCESS CANNABIS THREE WAYS: BY REGISTERING WITH LICENSED PRODUCERS, BY REGISTERING TO PRODUCE A LIMITED AMOUNT FOR THEMSELVES OR DESIGNATING SOMEONE TO PRODUCE IT.

INDUSTRIAL HEMP

In the wet spring of 2017, Brazeau County farmer Delvin Hughes waited in vain for the ground to dry before seeding his first hemp crop, yet he had to meet the planting deadline for crop insurance. Into the still-wet soil, the seeds sank deep. By August, most of the maturing plants were small, spindly and widely spaced. Not bad considering he expected to get zilch, shrugged Hughes. But not ideal.

On the same August day, a few kilometres to the east, crop scientists Dick Puurveen and Miles Dyck stood before a thick stand of hemp growing two to three metres tall, on the Faculty of ALES' Breton Plots, southeast of Drayton Valley.

In this, their first-ever experimental hemp crop, Puurveen and Dyck grew five varieties, with both drill seed and broadcast methods, and found that “under good drainage conditions, [hemp] can grow prolifically,” says Puurveen.

There were other measurements of success, too.

“This stand, with stocks so close together is preferable because it produces long fibre with less hurd (the interior stalk),” says Byron James of InnoTech, the Alberta agency that currently operates the province's only decorticator. It separates



“It's important to break those stigmas by proving science and research can bring credibility to the implied medical benefits, while also advancing and innovating within the agricultural industry.”

Sheldon Croome, CEO of Atlas Growers Ltd.

hemp fibre for use in an array of items that exploit its strength and biodegradable qualities.

The plants' seeds also met James' approval during a crop tour the scientists hosted for a few dozen farmers and local officials. Hemp seeds are in demand as a food supplement for their high protein content and nutty flavour.

“I predict your seeds will be over 1,000 pounds per acre, so this a good crop,” James told Puurveen.

During their experiment, the scientists discovered that the broadcast method, in which seed is spread onto the surface and incorporated with light tillage, resulted in more plants per square metre. They also found that alfalfa was a great crop to follow in the plot, because it doesn't require fertilizer or an herbicide to control its weeds—and such organically grown seeds fetch a premium price. Finally, they showed that a variety called Finola was the highest seed producer after an early harvest.

For farmers keen to understand whether growing industrial hemp is worth their attention, the research demonstrates why real-world scientific assistance is far preferable to individual trial and error.

“Farmers are always looking for another cash crop and if they can make this one work they will adopt it,” says Dyck.

“But if you're going to interest a new generation of people, you have to be able to say how it works,” says Puurveen.

2017

(APRIL): BILL C-45, THE CANNABIS ACT, IS INTRODUCED. THE ACT WOULD ALLOW PEOPLE OVER 18 TO POSSESS 30 GRAMS OF DRIED OR EQUIVALENT NON-DRIED CANNABIS, SHARE IT WITH OTHER ADULTS, PURCHASE IT FROM PROVINCIALLY LICENSED RETAILERS, GROW UP TO FOUR PLANTS PER HOME AND MAKE CANNABIS FOOD AND DRINKS AT HOME. OTHER EDIBLE CANNABIS PRODUCTS WOULD BE AVAILABLE FOR PURCHASE ONCE RULES ARE DEVELOPED. THE ACT IS REQUIRED TO PASS ROYAL ASSENT BEFORE BECOMING LAW.

2018

(July): Projected date for law to go into effect, if it passes through both Houses of Parliament.

GROW IT

Alberta is gearing up to be a national player in cannabis production. At press time, there were eight new production facilities in planning or development.



- COMPANIES IN ALBERTA WITH HEALTH CANADA LICENSES, AS OF OCTOBER 2017
- COMPANIES CLOSE TO LICENCES
- COMPANIES GEARING UP

Atlas Growers
LAC ST. ANNE

- Late-stage applicant, aiming for early 2018 license
- Broke ground in summer on 38K sq. ft facility
- Jim Hole hired as expert in growth/irrigation etc.
- Pres Sheldon Croome is a UAlberta alumnus in BCom

Acreage Pharms:
PEERS

- Licensed March 2017
- Has built 6,800 sq. ft. facility. Says it can go as high as 30K sq. ft. on that site
- Bought by a Vancouver company Invictus immediately after its licensing
- Invictus has another property planned, not yet licenced, and says initial build will be 42K sq. ft.

Sundial Growers:
OLDS

- Licensed June 2017
- Says it will soon have 130K sq. ft. facility with plans for 400K sq. ft.

Aurora Cannabis/Aurora Sky:
CREMONA

- Aurora Cannabis is in Cremona
- Aurora Sky under construction at Edmonton International Airport
- Licensed 2015
- In Cremona, it has a 55K sq. ft. facility
- 74K sq. ft. plant near airport to be ready by 2018
- Wants to be biggest in the world

Canopy Growth
EDMONTON

- Canada's largest company, now expanding to Alberta
- Licensed 2013
- Leased 49K sq. ft. warehouse, has MOU for 160K sq. ft.
- Plans to open early 2018

GrenEx Pharms Inc.
EDMONTON

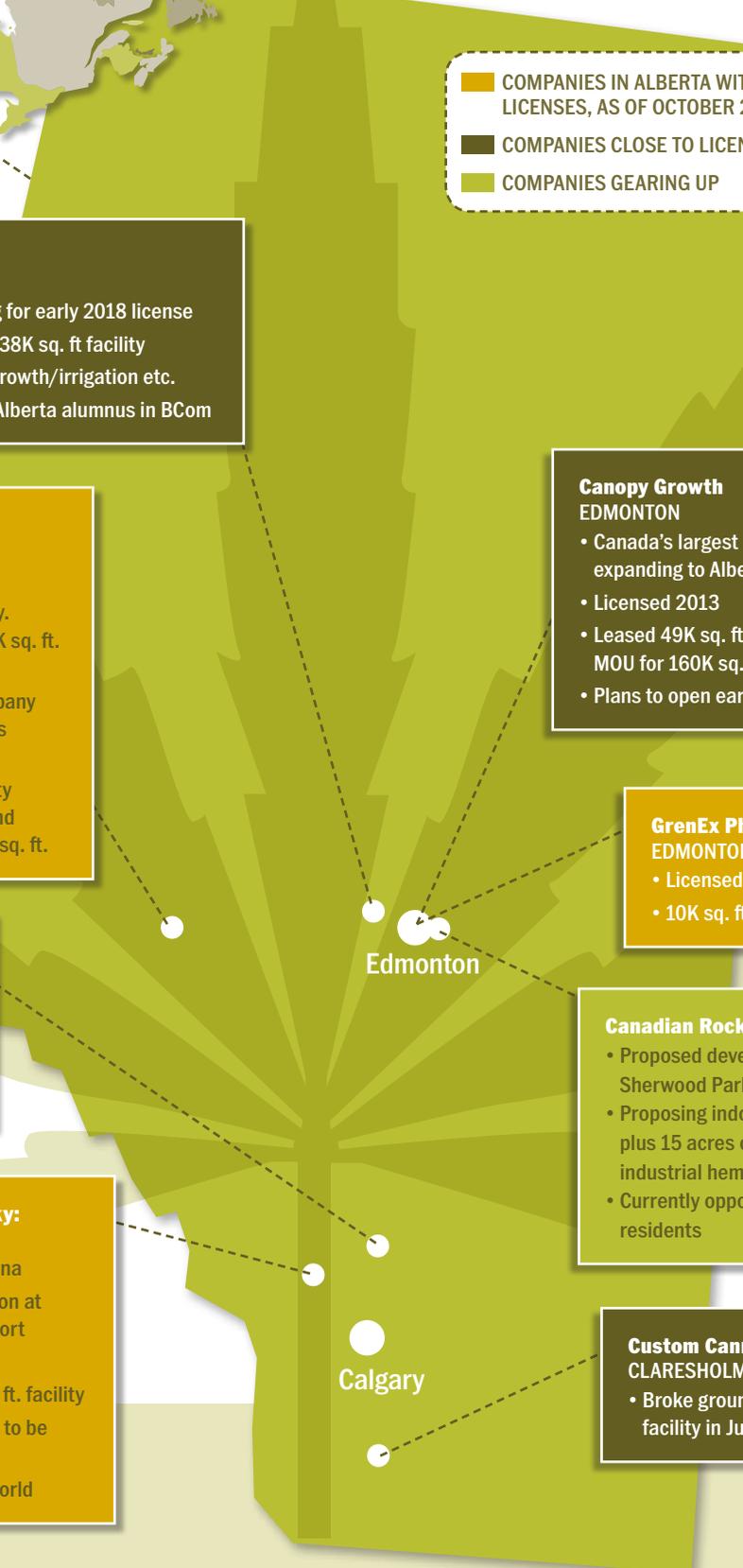
- Licensed September 2017
- 10K sq. ft. facility

Canadian Rockies Agriculture

- Proposed development in Sherwood Park
- Proposing indoor greenhouses, plus 15 acres of outdoor industrial hemp farm
- Currently opposed by local residents

Custom Cannabis
CLARESHOLM

- Broke ground on a 65K sq. ft. facility in June 2017



shutterstock



MARIJUANA

The plant *Cannabis sativa* is bred to produce either marijuana or hemp, each with vastly different percentages of the compound tetrahydrocannabinol (THC).

VS

- Small, bushy plant (approximately half a metre high)
 - A psychoactive that affects the brain and nervous system for intoxicating and therapeutic purposes
 - Contains more than 0.3 per cent THC in its leaves and flowering heads. Needs 1.0 per cent THC to be intoxicating.
 - Also contains cannabidiol (CBD) believed useful for inflammation, nausea, pain, etc.
 - Medical marijuana legal in Canada since 1999
 - 130,000 registered medical marijuana users in Canada
 - Global medicinal marijuana market estimated at \$50 to \$100 billion
 - Canadian cannabis sales projected to be \$4.6 billion in 2019*
 - Seeds high in essential fatty acids and proteins
 - Biomass also a source of CBD, valued at approximately \$30 bushel
- Tall, thinly stalked plant (one to four metres high)
 - A sustainable resource with unlimited uses as a fibre, food, biofuel, oil and pharmaceutical
 - Contains 0.3 per cent or less THC
 - Legal since 1998 to grow commercially for seeds and stalk
 - Currently illegal to use leaves or flowers
 - Quick growth, high yield; drought tolerant; photosensitive (flowers when light lessens)
 - Light, strong and insulating
 - 23,000 products already use hemp, from insulation to car panels, snacks to cosmetics

*MMJ Industry Update, April 2017, PI Financial Corp.

INDUSTRIAL HEMP



NEXT-GENERATION SCIENCE NEEDED, OH ... YESTERDAY

MEDICAL AND RECREATIONAL MARIJUANA

It sounds foolproof—just grow high-quality marijuana and you'll surely succeed in both the expanding medical and recreational markets. Not exactly, says medical marijuana entrepreneur Sheldon Croome.

"The black market won't go quietly," he says. "It's very important that there are licensed products adhering to quality controls."

For the same reason, many licensed competitors are needed, he says. For all of them to stay competitive they will need multiple product lines, which requires a surge of future scientific development. The medical and recreational products he envisions popping up immediately include:

- Controlled dosage gel capsules
- Transdermal patches
- Topical products containing CBDs and THC
- High-end vaporizers
- Beverages and packaged edible products

Setting aside actual products, Croome says medical marijuana advances are still needed at the most basic level for the industry to thrive long-term. There are more than 100 compounds in the cannabis plant, most largely unstudied.

"How do we isolate certain compounds and use those to target certain ailments? Some early research says that some of these compounds work together to produce effects. Which ones?"

INDUSTRIAL HEMP

On their first try, ALES crop researchers Dick Puurveen and Miles Dyck grew an impressive experimental stand of industrial hemp, but their success simply beget more questions.

"If you have an eight-foot plant producing a lot of fibre, how do you manage that and not wreck your harvest equipment?" says Puurveen.

As important: how can farmers handle hemp plant residue, in which substantial portions of the plant (the leaves and flowers) are mandatory waste product under current Canadian law?

If the law changes, as it's expected to, with the government acknowledging that the low psychoactive content found in hemp is not a threat if unregulated, then to whom can farmers expect to market the believed-to-be-beneficial cannabidiols in its biomass? "They haven't even gotten into real research of the pharmaceuticals," says Puurveen.

"On the more practical side, how does hemp fit into a typical farm rotation?" asks Dyck. "There are basic fertilization and crop management needs to be studied."

New hemp farmer Darren Haarsma '14 MSc (REES), also welcomes research on what to do with the hurd inside a hemp stalk. "The high-quality bast (exterior) fibre is used in textiles and other biomaterials. The hurd, the thinner part, is about three-quarters of what you get from every stalk," he says. "It's lower quality, so in order to justify the cost, there has to be something you can do with it."

"Compared to other crops it's a totally different game," says Haarsma, who also grows conventional grains and specialty potatoes on his family's farm near the border of Spruce Grove and Edmonton. "You don't have many options for where you're selling, or sources of information from your neighbours."

To lay the foundation for science and innovation in the Canadian cannabis industry, the Faculty of Agricultural, Life and Environmental Sciences plans to host a conference in 2018 that will bring together industry, academia, government and non-governmental organizations.

Themes for discussion will include optimal production, harvesting and processing, product quality and safety, pharmacology, value-addition/value chain economics, and the likely challenges, including regulation, communication and growth.

"This is the role we have played with so many of our agrifood commodity groups," says Stan Blade, dean of the faculty.

"It's an opportunity for a neutral third party group to invite all the players together, to assess the need for science in this new industry and get thoughts on how this industry can apply it."

THE HEMP HUSTLE: AN ALUMNUS' STORY



Long before Darren Haarsma earned his master's in resource economics in 2014, he had learned a thing or two about being an entrepreneurial farmer from his father and grandfather.

About 20 years ago, they expanded the family farm near Spruce Grove from wheat, barley, oats, peas and canola to grow “little potatoes,” a previously overlooked speciality crop that's efficient to grow, compatible with local soils and appeals to a range of consumers.

“I was looking for something like that,” says Haarsma, who also knew any experiment he undertook had to fit the farm's conventional growing systems. Specialized equipment was out of the question.

Inspired by hemp farmers near Red Deer and hemp-manufacturing entrepreneur Dan Madlung of BioComposites Group, he and his family planted a small trial of 50 acres of industrial hemp in 2016, without even having a customer lined up.

“I saw the possibility of having multiple products from one crop. The whole fibre industry and bio-material potential really excited me,” says Haarsma.

A chance meeting with a small Edmonton company marketing hemp seeds at local farmers' markets gave him a customer for his test crop. With a bigger retailer on board in 2017, he planted 400 acres this past summer and, so far, sees a lot of practical positives as a farmer of industrial hemp.

It grows extremely well in soil that is suitable for potatoes, and as a photoresponsive crop, hemp's growth speeds up

during the long summer days in central and northern Alberta's latitude.

As well, for Haarsma's first harvest, “we were able to combine it with snow on the ground because the stands are so high.”

There are challenges, though. Besides the seeds, most of the hemp plant cannot yet fulfil its potential as a cash crop—for two important reasons.

Despite Madlung's BioComposites Group having developed numerous potential products using hemp fibre, the Alberta market for the raw fibre isn't well-developed yet because there

Above: Darren Haarsma examines the hemp stalks he has stored on his family farm. The thinner part of the stalk, seen below, is lower quality than the high-quality exterior, known as bast.





is only one plant separating hemp fibre locally. It is owned by the province's InnoTech.

That will change in 2018 when Sunstrand, a Kentucky firm that separates fibres, opens a facility in Alberta. Haarsma is storing his waste stalks, but that's space-consuming, and as organic material, they are susceptible to moisture.

Even more problematic is that three quarters of the entire hemp plant, including its most valuable parts, is literally being trashed because of outdated regulations.

Growing industrial hemp for its seeds and fibrous stalk has been legal in Canada since 1998, but the rest of the plant is classified as a narcotic product and is therefore illegal to use. That's a huge loss for growers because the low percentage of THC in the leaves and flowers of hemp plants will not get anyone high, but the cannabidiols they contain (CBDs) are an extremely useful ingredient—employed in prescribed doses only—for pain, inflammation and anxiety, with potential for neurological disorders such as epilepsy.

As a third-generation entrepreneur with a solid education, Haarsma believes he's taking a measured gamble on this promising product, but understands that nothing is ever a sure thing, not even such currently legal products as hemp seeds.

"It's a niche food," he said. "I think it has a huge potential to be a high protein source, so for example, to be used in smoothies instead of whey powder. But there are a lot of things out there that could be just as good. And people are fickle. They may decide that hemp is boring or too expensive and the market could dry up."

In science, theories change. Conclusions change. Directions change.

As Bill C45 (The Cannabis Act) is debated in Parliament, and as farmers and entrepreneurs weigh the pros and cons of industrial hemp, how Canadians deal with the spoils of the plant *Cannabis sativa* will surely depend on how science answers our many questions.

The two products—marijuana and hemp—are very different, says ALES faculty dean Stan Blade, and one industry may leap ahead of the other. Yet each promises a significant economic prize.

"There's a little bit of a gold rush fever here, so our role is to create the evidence and work with our partners to take a very pragmatic look at it."

As theories, conclusions and directions about the plant's usefulness in medicine and manufacturing evolve, "our faculty can certainly be seen as the hub, to incorporate all this expertise that exists at the University of Alberta." ▀



"If we knew what it was we were doing, it would not be called research, would it?" Albert Einstein

REMARKABLE RESULTS

THESE ALES ACHIEVERS ARE OUTSTANDING IN THEIR FIELDS, AS RECOGNIZED BY THEIR ALUMNI AWARDS.

This fall, the Faculty of Agricultural, Life and Environmental Sciences celebrated four of the faculty's alumni who have been recognized for their outstanding contributions with a 2017 University of Alberta alumni award.

GIVING BACK TO THE LAND

Distinguished Alumni Award winner **Wayne Lindwall**, '71 BSc(Ag), '75 (MSc) has helped change the way land is farmed in Canada and beyond. His leadership in soil conservation created a more sustainable way to grow crops—called conservation tillage—that has improved soil and water conservation, reduced costs, increased food production and contributed to lower carbon emissions around the world.

But he didn't start out that way.

"I worked as a summer student in the late 1960s at the Lethbridge Research Station," he says. "I wanted to work for a large machinery company, but my friend, who had a job there, said 'you might like research.'"

That first summer blossomed into a career that focused on soil sustainability, conservation and the

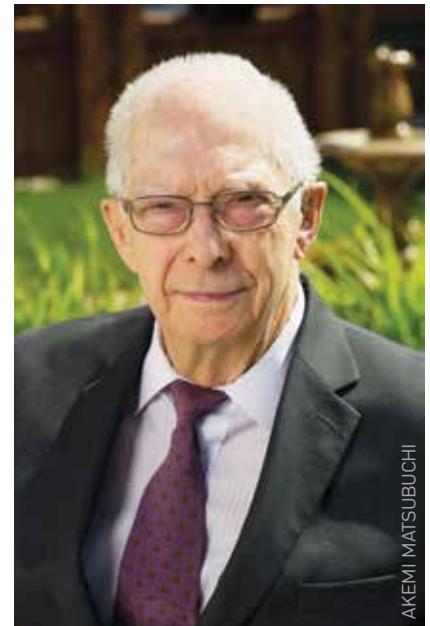
then-new concept of no-till farming, also known as conservation tillage or, as of 1991 in the Canada census, "direct seeding."

Conservation tillage is now used on more than 70 per cent of seeded land in Western Canada, but the impact goes far beyond the farm: by keeping organic matter in the soil, conservation tillage can significantly reduce the carbon dioxide that enters the atmosphere.

"In the '70s I was told the idea was impossible. Today, 75 per cent of farmers are doing no-till farming.

"Landscapes have changed completely," he says and that, while he was "just a cog in the wheel", he's gratified by both the alumni award recognition and the fact that "a group of innovative farmers set up groups

with their own financial needs in mind and said, 'you know, I think Wayne is onto something here.'"



AKEMI MATSUBUCHI



JOHN ULAN

A SCHOLAR AND A GENTLEMAN

Be thorough and work the problem. These words could be the credo under which **John Kuspira**, '55 (PhD), has lived his life. As the U of A's first recipient of a PhD in genetics, this world-renowned plant geneticist promptly began to change the field of genetics research across the university (by creating the Department of Genetics in 1961) and the country (by helping establish the Genetics Society of Canada in 1957).

Kuspira's pioneering work in plant genetics is known around the world;

the same basic principles, with modifications to the technique, are used by geneticists today to study the heredity of humans and other animal species. Kuspira, who received an Honour Award, was also a beloved professor of a very popular genetics course that attracted about 10,000 U of A students over 35 years. His problem-solving approach to teaching the subject challenged the critical thinking abilities of students, a skill that many carried forward. Many of his former students are now dispersed around the world, to countries including South Korea, Pakistan, Thailand, Switzerland, across Canada and the United States.

Now retired, Kuspira maintains his attitude to research rigour: "I feel strongly that it is a person's obligation to seek out answers to questions, no matter how complex," he says.

LEADING BY EXAMPLE

Donald C. Brinton, '51 BSc (Ag), also received a Distinguished Alumni Award this year. He has the distinct honour of having spoken the first words on Alberta's first television station in 1954.

While researching permafrost in the Northwest Territories before his final

year of study, Brinton worked as a radio announcer in Yellowknife, which led to a job producing rural radio reports for the Alberta Federation of Agriculture. He soon began working for CFRN radio and, a few years later, was the first broadcaster to hit the air on CFRN-TV, doing newscasts, cohosting *The Noon Show* and creating a variety of programs for the station.

Starting in 1964, Brinton went off-camera to spend decades creating what is now a legacy of quality Canadian television programming. He has always believed in giving back to his community and has served on the U of A Board of Governors, as well as boards of the Television Bureau of Canada, Winnipeg Symphony Orchestra, Banff Television Festival, Academy of Canadian Film and Television and many more. In 2016, he was invested as a member of the Order of Canada.

Asked why television was such a natural fit, Brinton says: "I finally believed sincerely that I was meant for this kind of a role because television was a beautiful mixture of things that I think I had some interest in and talent for."



CURTIS TRENT

GROWING A FRUITFUL CAREER

Lalitha Taylor, '05 BSc (Nutr/Food), was diagnosed with rheumatoid arthritis at 19. Her desire to help prevent and manage the disease, and provide other individuals with a greater quality of life, prompted her to become a dietitian. She has created educational videos, volunteered at public hospitals in Peru and South Africa and has received awards for her many contributions. Taylor donates time to her local community, including Youth Empowerment and Support Services, the Arthritis Society, Ronald McDonald House, Red Willow Community Church and the U of A nutrition program, where she mentors students. She is passionate about strengthening the health of communities through nutritional education and shares her knowledge at daycares, schools, churches and community organizations.

"When I received this award I didn't think of myself; I thought of my profession," says Taylor. "I am so proud of the role dietitians play in society today. We encompass health and sustainable living through quality of life." 🍃



JOHN ULAN



1.

CENTENNIAL CELEBRATIONS AROUND THE CORNER FOR HOME ECONOMICS AND HUMAN ECOLOGY

ANNUAL ALUMNI TEA PREVIEWS WHAT'S TO COME IN 2018

BY HELEN METELLA / PHOTOGRAPHY BY JESSICA FERN FACETTE

In the Household Economics Class of 1957, three young women with surnames Anderson, Bailey and Ball were always seated alphabetically, so not surprisingly they became friends.

On Alumni Weekend 2017, they—now Ann Anderson Seagrove, Eleanor Bailey and Arlene Ball Smith—found seats together again for the Home Economics/Human Ecology Tea. They traded memories of the time when nutrition, food preparation, clothing and textile studies—as well as biology and microbiology—were all taught from what was then called the School of Household Economics in the Faculty of Arts and Science.

“We felt so privileged that we could

go to university because our parents had all grown up in the ‘Dirty ‘30s,’” said Seagrove, who earned a bachelor of science degree in the three-year program.

The trio were part of more than 80 graduates who attended to celebrate the contributions that the program made and continues to make to science and community since the Department of Household Economics was established at the University of Alberta in 1918 (becoming the School of Household Economics in 1928 and the faculty of Home Economics in 1976).

The tea was also a mini preview of the lively and informative events that next year’s centenary celebrations for



2.

1. Lorna Connolly '47 BSc (Home Ec) and Margaret McIver '47 BSc (Home Ec).

2. Lorna Connolly '47 BSc (Home Ec) and Sophie Rasko '47 BSc (Home Ec).



home economics at the University of Alberta will hold throughout 2018.

With household economics' diverse studies now assigned to the Faculty of ALES' Department of Human Ecology or to the Department of Agricultural, Food and Nutrition Science, representatives from each department made eloquent presentations about significant recent accomplishments.

Master's students Josée Chartrand, Meg Furler and Pat Siferd illustrated the problematic lack of standards in women's clothing sizes they discovered while creating their popular exhibit *Misfits: Bodies, Dress and Sustainability*, earlier in the year.

Carla Prado, director of the Human Nutrition Research Unit in the university's Li Ka Shing Centre, explained how the world-renowned facility for testing the relationship between high fat and low muscle mass is ready to invite the public in to receive individualized assessments.

For the 100th anniversary year of home economics and human ecology at the University of Alberta, one of the first major events is the Empey Lecture in March 2018. Sherry Ann Chapman, an alumna of the Department of Human Ecology, will reflect on how the profession was established amid, and shaped by, the Industrial Revolution. Then, with human-ecology history as a point of reference, she will ask: "How



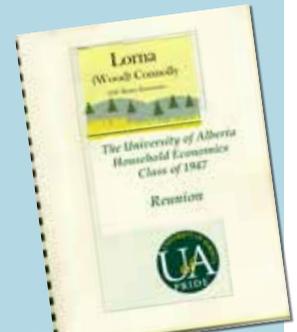
are human ecologists contributing to the future and the urgent need for life-sustaining societies?"

A scholar and Professional Human Ecologist (PHEc), Chapman facilitates lifelong learning and dialogue among citizens, practitioners, policymakers, and researchers as we strive for sustainable and collective well-being.

Keep an eye out for details for this centenary event and others, which will be announced soon through emails and social media. 🍀



1. Guests at the tea heard from faculty and students on aspects of human nutrition and material culture.
2. Left to right: Sophie Rasko '47 BSc (Home Ec); Lorna Connolly '47 BSc (Home Ec); Margaret McIver '47 BSc (Home Ec).
3. Left to right: Sophie Rasko '47 BSc (Home Ec); Olga Porylo '57 BSc (Home Ec); Anne Sawka '48 BSc (Home Ec).
4. Lynne Chalmers '67 BSc (Home Ec).
5. Nadine Lai, '17 BSc (HeCol).
6. A commemorative copy of the tea's program.
7. Linda West, '71, BSc (Home Ec).
8. Speakers Catherine Field (L), professor, Department of Agricultural, Food and Nutritional Science; Deanna Williamson '95 PhD (HeCol)(R), chair, Department of Human Ecology.
9. Marilyn McNeil-Morin, '77 BSc (Home Ec).



91-YEAR-OLD ALUMNA SAYS SCIENCE ALWAYS RULED IN HOME ECONOMICS STUDIES

Lorna Connolly says her studies in basic cooking and sewing skills were not the dominant part of the curriculum when she graduated with a BSc in Household Economics in 1947.

"We had *a lot* of science courses," says the 91-year-old. "Multiple chemistry courses, as well as zoology and biochemistry. Zoology was really helpful for me as a dietitian because you would learn the parts of the body and the function of the digestive system in rats and rabbits."

After the three-year program, in which all students covered the same material, they could take an internship in either commercial kitchens or hospital nutrition. Those who chose the commercial side often found work in dining rooms of university residences or fine department stores across Canada.

Connolly took the hospital nutrition route and despite a 20-year break to raise a family, she returned to the field as a hospital dietitian and eventually became president of British Columbia's Association of Dietitians. She also helped establish B.C.'s still existing Dial-A-Dietitian program. In pre-computer days, she created many of the research files the phone-operators consulted when people called for information.

Connolly credits the strong foundation she received while earning her degree for enabling her to pursue a satisfying career.

"It gave you such a well-rounded experience," she said. "I used everything, except political economy!"



IN MEMORIAM

The Faculty of ALES notes with regret the passing of its following alumni:

ALIX ROBERTA DAY

'39 BSc(HEc), of Summerland, B.C.,
in July 2017

DAVID EDWARD DAVIDS

'42 BSc(Ag), of Medicine Hat, AB,
in June 2017

About David Davids

Dave was a multi-talented individual, distinguishing himself both as a musician and as a scientist. After graduating from the University of Alberta with a major in agriculture, he joined the Royal Canadian Air Force during the Second World War, first as a bandsman in what became the North West Air Command Band, then transferred to bacteriological research in the later stages of the war.

LAVERNA FRANCES JENNINGS (QUINN),

'44 BSc(HEc), of Calgary, AB,
in March 2017

JAMES WATARU HIRONAKA

'49 BSc(Ag), of Raymond, AB,
in January 2017



ALFRED EDWIN HARPER

'45 BSc(Ag), '47 MSc, of Redmond, WA,
in March 2017

About Alix Day

This gentle matriarch dedicated most of her life energies supporting individual family members and giving them a spiritual and compassionate moral compass to guide them through the rocky roads that life provides.

CHARLES EDGAR FRENCH

'50 BSc(Ag), of Cardston, AB,
in July 2017

ISABEL MARGARET CERNY (RUSSELL-EWING),

'51 BSc(HEc), of Toronto, ON,
in March 2017

R.C. CLINTON MOFFAT

'53 BSc(Ag), of Winnipeg, MB,
in April 2017

GLEN THOMSON MORRISON

'53 BSc(Ag), of Okotoks, AB,
in April 2017

About Glen Thomson Morrison

Glen was a well-loved 4H leader and assistant leader sharing his talent for teaching and his knowledge and passion for agriculture.

BETTY JANE FITZPATRICK

'54 BSc(HEc), of Don Mills, ON,
in August 2017

AKRAM QUADRI

'58 BSc(Ag), of Orange, CA,
in August 2017

WILLIAM NORMAN MCLACHLAN

'63 BSc(Ag), of Port Alberni, B.C.,
in April 2017

THEODORE ROY HELLQVIST

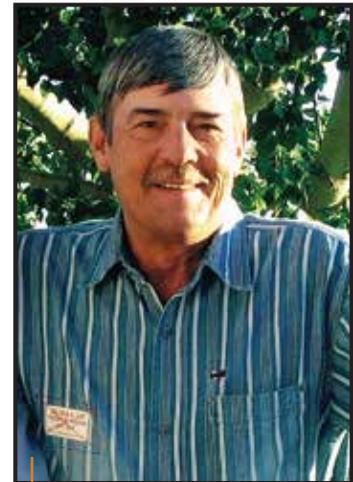
'70 BSc(Ag), of Calgary, AB,
in September 2017

GARRY JOSEPH KITZ

'77 BSc(Ag), of Two Hills, AB,
in August 2017

PHILIP ALFRED THACKER

'82 PhD, of Langley, B.C.,
in February 2017



ELTON DUNK

'70 BSc (Ag), of Edmonton, AB,
in April 2017

BEVERLY J MARSDEN

'84 BA, '95 MSc, of Port Moody, B.C.,
in August 2016

About Betty Jane Fitzpatrick

Betty loved hiking, cooking, swimming, CBCs The Sunday Edition, the memory of Harriett, her inspiring mother, Chopin, crème brûlée, checking her stocks in "The Globe," gin and tonic, Algonquin Park in the fall, the Rocky Mountains ... and so much more.



Enhancing Everyday Life



EMPEY LECTURE

Celebrating 100 Years of Human Ecology & Home Economics



A look at the history, accomplishments and future directions of Home Economics/Human Ecology.

Presented by: Dr. Sherry Ann Chapman

Thursday, March 15, 2018 | 5 p.m.



**Watch from anywhere in the world:
livestream.com/uAlberta**



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