



ALES GRADUATE RESEARCH CONFERENCE 2026

Convergence: Cultivating
Sustainable Futures
Through Interdisciplinary
Action



March 4-5 | Students' Union
Building (SUB) Basement

alesgsa@ualberta.ca

<https://alesgsa-ualberta.ca/conference.html>

LOCATION

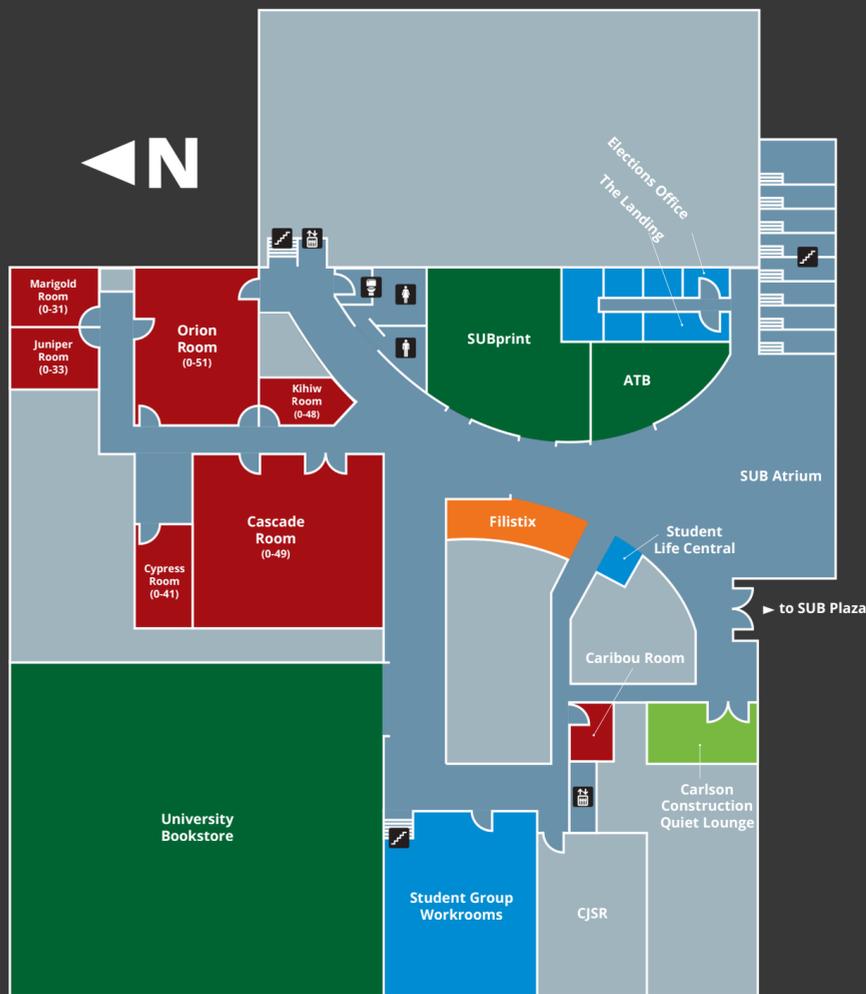


Students' Union Building (SUB) Basement

Located at 8900 – 114 Street NW in Edmonton, SUB is at the centre of North campus and easily accessible by car or transit.

See Next page for Basement Map.

lower level



Student Space	Food	Services
Businesses	Venues	Offices & Administrative

0-90	Carlson Construction Quiet Lounge
0-0192	UCNiversity Bookstore
0-1620	USUBiversity Bookstore
0-604	ASUTB pFinancial AFITIBs
0-6741	tFinancial MFilesetixng Centre Marigold Room
0-71	MJuneipteinr gR oCoemntre
0-31	MCyaprrigeosld R Rooomm
0-33	KJuihniwpe Rr oRoomom
00-4311	CCaypscraedsse RRooom
00-4383	OKirhioiwn RRooom
00-4491	CCasricbaodue RRooom
00-5418	Orion Room
00-7479	CJSR
0-51	Counselling and Clinical Services
0-09	Stetmudponatr Gy rlocuapt
0-1111	Wohorkrooms
0-68A	The Landing UASU Elections Office
0-68B	S
0-608-8F1	tSttuuddeenntt GLirfoeu Cpe nTatsakl Spaces
0-68J	
0-81	Student Life Central

Land Acknowledgement

The University of Alberta, where we are gathered for the ALES GSA conference, is situated on Treaty 6 territory, the traditional lands of First Nations and Métis peoples. We acknowledge the historical and ongoing stewardship of this land by diverse Indigenous peoples, including the Cree, Blackfoot, Métis, Nakota Sioux, Iroquois, Dene, and Ojibwe/Saulteaux nations. This territory is subject to the signing of Treaties 1 through 11 and is a traditional meeting ground and home for many Indigenous peoples. We also respect the Honourable Treaty of 1906 and the commitments made therein. Further, we acknowledge that the University of Alberta and its campuses are located within the traditional and contemporary lands of the Papaschase, and we recognize this territory as the ancestral lands of the Métis.

This acknowledgement is not merely a recitation of history. It is a living commitment that directly connects to the core of what the Faculty of Agricultural, Life and Environmental Sciences (ALES) represents. Our faculty is dedicated to understanding and nurturing the interconnected systems of land, food, and people. We recognize that Indigenous Peoples have cultivated and stewarded these lands and ecosystems since time immemorial, developing sophisticated systems of knowledge in agriculture, ecology, and resource management.

As we engage in dialogue and share research, we honour the deep understanding embedded in Indigenous ways of knowing. We commit to listening, learning, and working in partnership to build a future that respects Indigenous rights and knowledge systems. May our time together be grounded in a shared responsibility to care for the lands, waters, and all relations that sustain us, today and for generations to come.



CONFERENCE SPONSORS



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Students'
Association**
University of Alberta



ALBERTA CANOLA
PRODUCERS COMMISSION



WELCOME MESSAGES

Dr. Rickey Yada

Dear ALES community and research conference attendees,

It's my pleasure to welcome you to the ALES student research conference. Seeing the breadth of what our faculty works on in one place never ceases to amaze me, and it's particularly special to see the efforts of our student researchers – the change-makers of today and into the future.

This past academic year, ALES celebrated significant wins of our community members and continued to advance a breadth of research collectively addressing the entire human experience. We were proud to see our faculty – including Scott Chang, Michael Gänzle and Carla Prado – on the Clarivate's Highly Cited Researchers list, which comprises authors of multiple scientific papers ranking in the top one per cent in the world by citations for their field and publication year over the last decade. We also contributed to the U of A ranking in the top ten globally for its impact on sustainability, as well as the university's rise to 96th worldwide in life sciences, which includes programs in agriculture and biological sciences. Hard-working staff achieved all this while maintaining the high-impact teaching, research and community engagement we're known for.

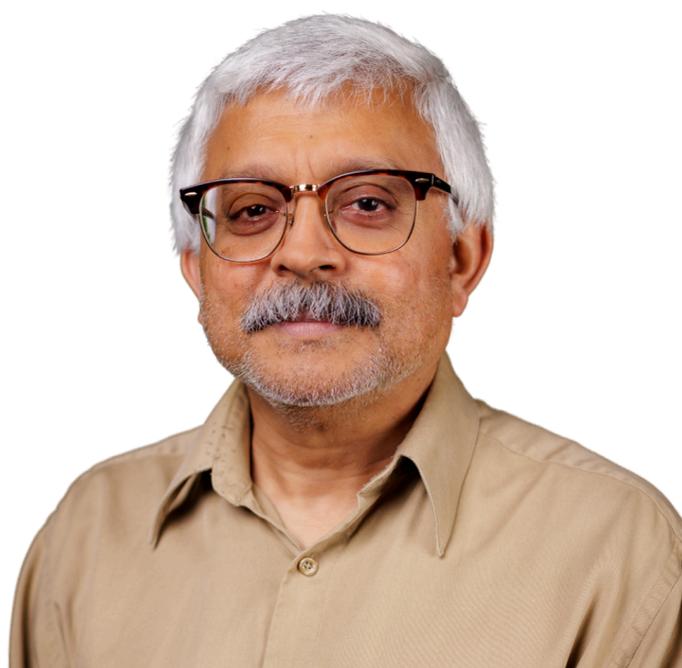
We also completed and launched our new faculty strategic plan in September, which many of you contributed to through surveys and focus groups to ensure the graduate student experience is represented. This comprehensive three-year plan sets us up to overcome challenges and harness opportunities, pursuing both quick wins and ambitious long-term goals. Key anticipated outcomes include strengthening interdisciplinary research, strengthening our internal community and enhancing teaching and programming. An implementation committee formed of representatives from various faculty constituencies has been meeting regularly to advance the recommendations in this report.

Events like this conference advance all of the important goals above, and are a great opportunity to meet or reconnect with peers in disciplines outside your own. Thank you again to the ALES GSA for organizing this conference, and for their support for our students throughout the year – all while engaging in their own studies and endeavors. The dedication of this group of volunteers is remarkable. Please join me in thanking them for facilitating this event, and rewarding their efforts by enjoying it to the fullest.

My gratitude again to everyone who participates in the conference. I look forward to learning with and from you.

Regards and cheers,

RICKEY YADA
Dean, Faculty of Agricultural, Life & Environmental Sciences
UNIVERSITY OF ALBERTA
College of Natural and Applied Sciences



Dr. Nat Kav

Over the past several years, ALES GSA has successfully organized a research symposium showcasing the groundbreaking discovery research being conducted by our graduate students. Last year, ALES GSA successfully expanded this symposium to a conference which was extremely well-received by everyone that attended. Not only did it showcase the superior research that is being conducted by our graduate students, but it also demonstrated the organizational and leadership skills of everyone that was involved planning and organizing such a successful conference. I am confident that, once again, this year the conference will be a resounding success.

As I have noted on previous occasions, graduate students form the vital core of the research that is conducted in the Faculty and, without your contribution we will not be the "research powerhouse" that ALES is recognized as within and outside of the University of Alberta. I will personally continue to support every initiative that improves the graduate student experience in ALES and look forward to continuing to work with the ALES GSA to achieve this objective. I look forward to attending the conference and learning more about the cutting-edge work that you do.

With very best wishes,
Vice Dean, Faculty of Agricultural, Life & Environmental Sciences
UNIVERSITY OF ALBERTA

Dr. Katherine Zwicker

Welcome from ALES Student Services

The Faculty of ALES Student Services team wishes to extend all participants and organizers of the 2026 ALES GSA conference a wonderful experience. In working with the organizers, we know a tremendous amount of work has gone into making the conference a success.

Supporting Your Academic Journey

It is a pleasure to support ALES graduate students in their academic and co-curricular endeavors. We remind all students that the ALES Student Services team is available to support ALES graduate students with many aspects of their program progression and student experience at the UofA. The Graduate Program Administrators, Charlotte and Robin, are available for advising, both booked and drop-in appointments, Tues-Thurs and have a wealth of knowledge about policies and processes, campus resources, navigating challenges, and more.

ALES Grad Life Newsletter and Resources

The Student Services team was pleased to launch the ALES Grad Life biweekly newsletter in Winter 2026. We hope the newsletter is an efficient and reliable source of information about key deadlines, scholarships, academic and professional development opportunities, and campus events, especially those hosted by ALES graduate associations. Newsletter submissions are welcome from the ALES graduate student body.

We are also excited to be launching an updated graduate student internal job posting board to help our faculty members recruit excellent candidates and improve the accessibility of experiential and professional development opportunities for our students.

The ALES Student Services team is committed to supporting your success throughout your program and we look forward to celebrating your accomplishments during this conference. Enjoy the conference!

Charlotte Bowman - Graduate Program Administrator
Robin McClelland - Graduate Program Administrator
Catherine Lieu - Student Program Coordinator
Nicole Barnard - Program Coordinator
Katherine Zwicker - Manager, Student Services



Dr. Guillermo Hernandez Ramirez



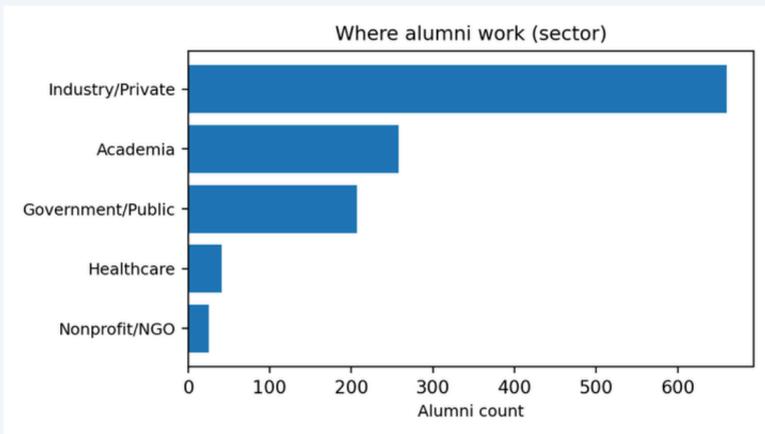
Over the past year, the Faculty of Agricultural, Life & Environmental Sciences (ALES) has advanced its graduate studies mission with a clear focus on student experience, success, equity, and community. Alongside the core work of supporting programs and learners day to day, the Faculty office strengthened the systems that make graduate education thrive—policies, communication, mentorship, and shared standards—while continuing to celebrate the excellence of its graduate students. A major accomplishment has been improving how graduate achievements are recognized and how information is shared. We led the creation and enhancement of new Faculty web pages that highlight graduate student awards and increase the visibility of graduate program documentation, policies, and guidelines. These updates were paired with improvements to the graduate program viewbook to strengthen recruitment and promotion, and to ensure prospective and current students can access clear, consistent information. Together, these efforts reinforce a meaningful, simple message: graduate accomplishments deserve to be showcased, and graduate pathways should be transparent, accessible, and easy to navigate. Equitable access to support was another central priority. We led the development and Faculty Council endorsement of new policies and guidance to inform and support a funding framework. This included practical procedures for transition and backstop funding, good practices for setting up graduate stipend appointments, and guiding principles for awards and scholarships. By establishing shared expectations and clearer processes, these initiatives help reduce uncertainty for students and supervisors, strengthen planning, and create a more consistent experience across the Faculty. Strong governance and listening-informed leadership helped drive this progress.

We met in person with each academic unit—REES, RENR, HECOL, and AFNS—to hear questions directly, share key graduate program metrics, and build a culture of data-driven decision making. Metrics such as time-to-degree completion are being used to identify opportunities to support better outcomes. We develop career prospects factsheets and infographics to inform graduate opportunities. Frequent engagements with the Faculty of GPS ensured ongoing coordination, responsiveness, and shared accountability. Several initiatives focused on improving the student experience from entry to completion. We renewed graduate admission protocols and implemented updated funding letters across the Faculty, becoming the first faculty on campus to complete this alignment. It also supported the transition to the Slate graduate admissions system through repeated, wide communication to build awareness and readiness. To strengthen continuous improvement, we created and implemented exit surveys for graduating students, ensuring that student voices inform future decisions. Building a spirit of community remains essential. We encourage the expansion of a mentorship program so that senior graduate students coach not only incoming graduate students but also senior undergraduates considering graduate school—deepening connection, improving the student experience, and supporting recruitment. We also contributed to graduate student orientation, provided guidance for new graduate programs, and coordinated Graduate Student Teaching Awards across ALES. This conference is a milestone in that same spirit of shared momentum. We invite every graduate student to participate actively—present, ask questions, make introductions, and celebrate one another's work. Conferences build more than résumés; they build community, confidence, collaboration, and a stronger Faculty. The progress of the past year reflects collective effort, and the next year's achievements will be shaped by the ideas, energy, and impact through excellence that graduate students deliver. Thanks!

Career Prospects Factsheet - Master of Science (MSc)

Based on alumni employment data (Dec 2025) | n = 1,191 | Primary fields: DEG1, EMPLOYER_NAME, JOB_TITLE

Where alumni work



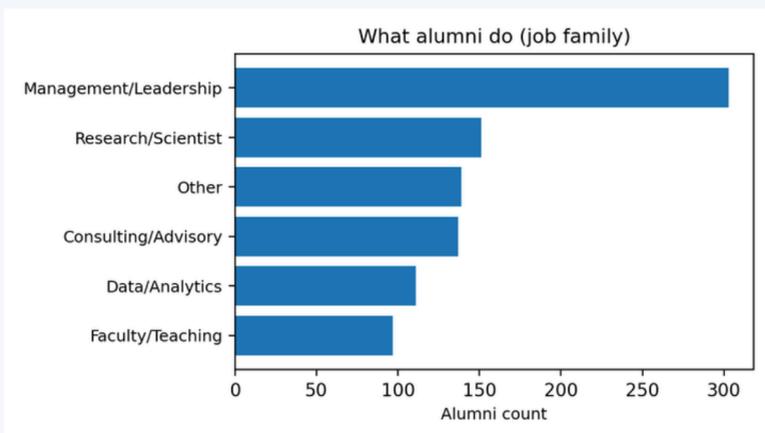
Snapshot

Most common sector: Industry/Private (55.4%)
Most common job family: Management/Leadership (25.4%)
Records with employer listed: 100.0%
Records with job title listed: 95.8%

Top employers (by count)

- University of Alberta (114)
- Government of Alberta (68)
- Government of Canada (21)
- Alberta Health Services (17)
- Natural Resources Canada (14)
- University of British Columbia (9)
- Parks Canada (7)
- Self-employed (7)

What alumni do



Common job titles

- Director (14)
- President (12)
- Assistant Professor (11)
- Owner (11)
- Associate Professor (10)
- Grad Research Asst Fellowship (9)
- Consultant (9)
- Policy Analyst (9)
- Project Manager (8)
- Professor (8)

Common prior degrees (DEG2-4):

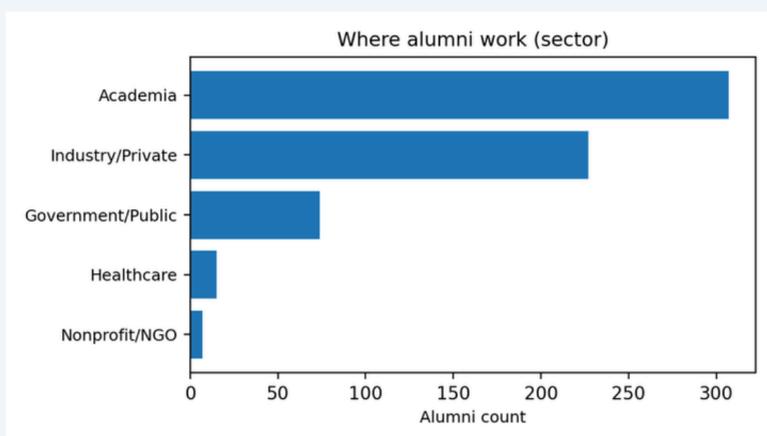
BSc in Agriculture (146) | BSc in Env. & Conservation Sciences (117) | BSc in Nutrition & Food Sciences (50) | BSc in Forestry (38) | BSc with Specialization (35) | BSc (4-year general program) (33) | BA (4-year general program)

Note: Sector and job family are derived from employer and title keywords; counts reflect exact text entries.

Career Prospects Factsheet - Doctor of Philosophy (PhD)

Based on alumni employment data (Dec 2025) | n=630 | Primary fields: DEG1, EMPLOYER_NAME, JOB_TITLE

Where alumni work



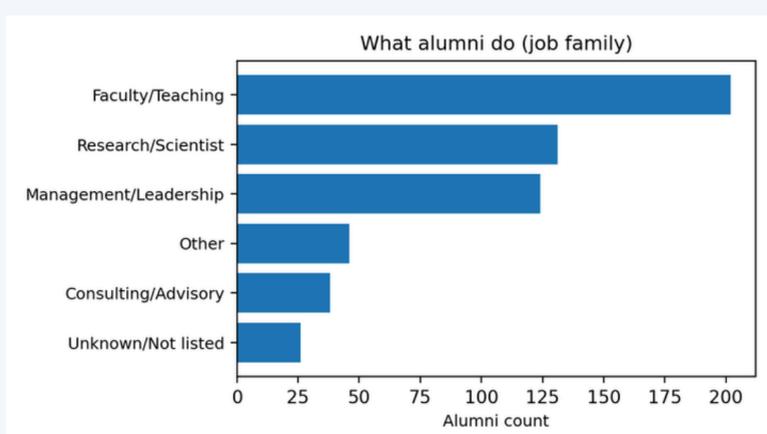
Snapshot

Most common sector: Academia (48.7%)
Most common job family: Faculty/Teaching (32.1%)
Records with employer listed: 1:00.0%
Records with job title listed: 95.9%

Top employers (by count)

- University of Alberta (87)
- Government of Alberta (24)
- Government of Canada (22)
- Natural Resources Canada (10)
- University of British Columbia (8)
- Dalhousie University (8)
- Alberta Health Services (7)
- University of Guelph (7)

What alumni do



Common job titles

- Assistant Professor (34)
- Associate Professor (30)
- Professor (23)
- Postdoctoral Fellow (16)
- Research Scientist (11)
- Director (9)
- Postdoctoral Researcher (6)
- President (5)
- ATS Assistant Lecturer (4)
- Principal (4)

Common prior degrees (DEG2-4):

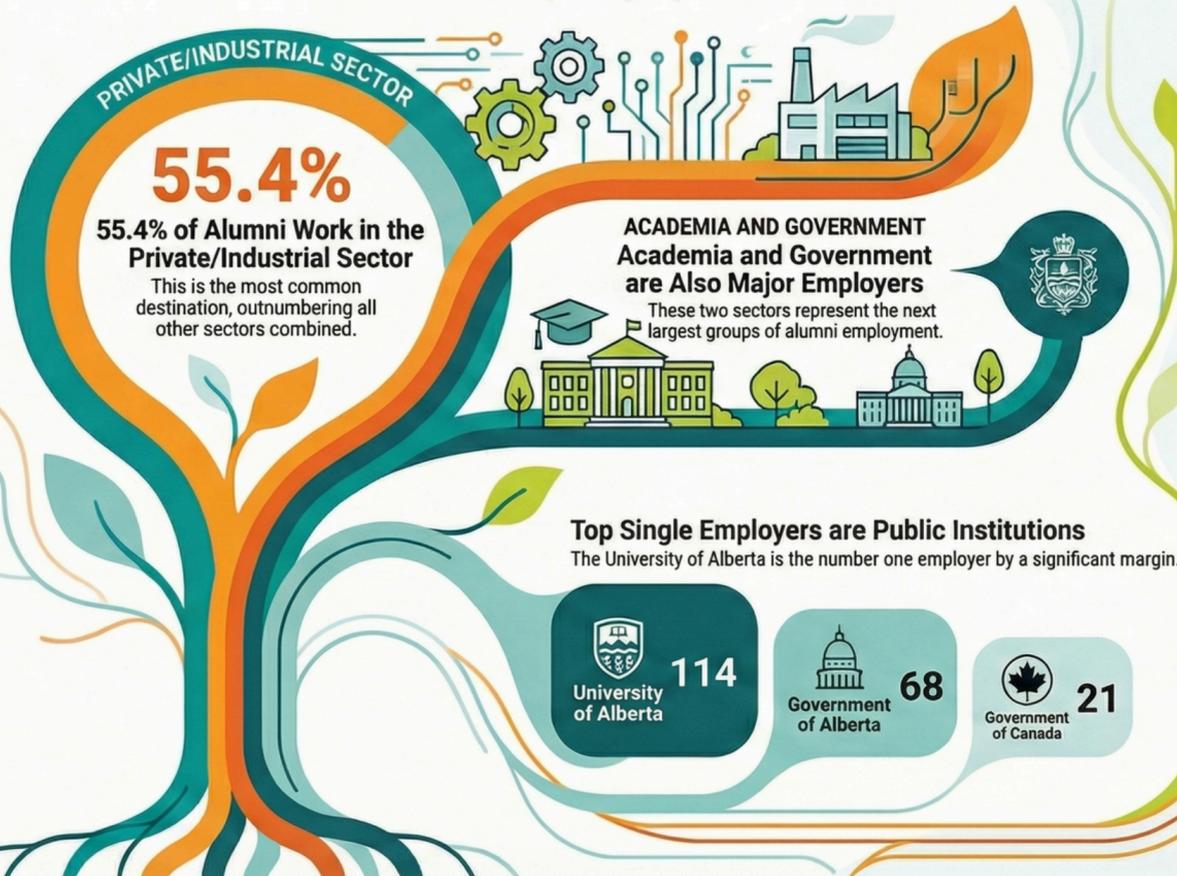
Master of Science (126) | BSc in Agriculture (33) | BSc in Nutrition & Food Sciences (16) | BSc with Specialization (12) | BSc (4-year general program) (12) | BSc in Home Economics (11) | BSc in Env. & Conservation

Note: Sector and job family are derived from employer and title keywords; counts reflect exact text entries.

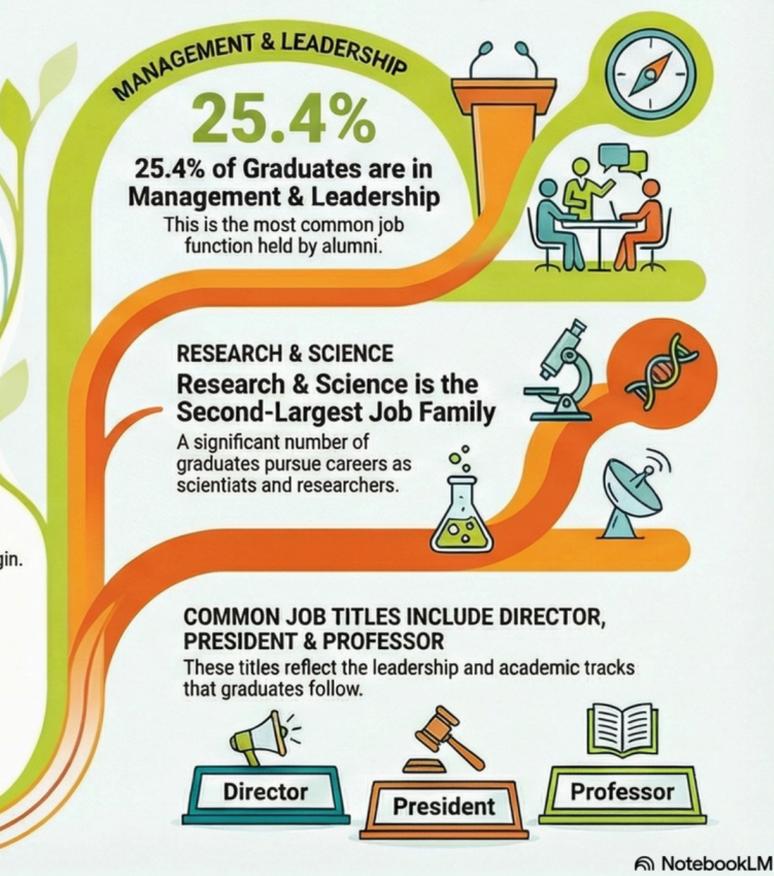
ALES MSc Alumni: Career Pathways & Outcomes

Snapshot of 1,191 graduates based on December 2025 employment data, showcasing sector distribution and key roles.

Where Alumni Work: Sectors & Top Employers



What Alumni Do: Roles & Responsibilities

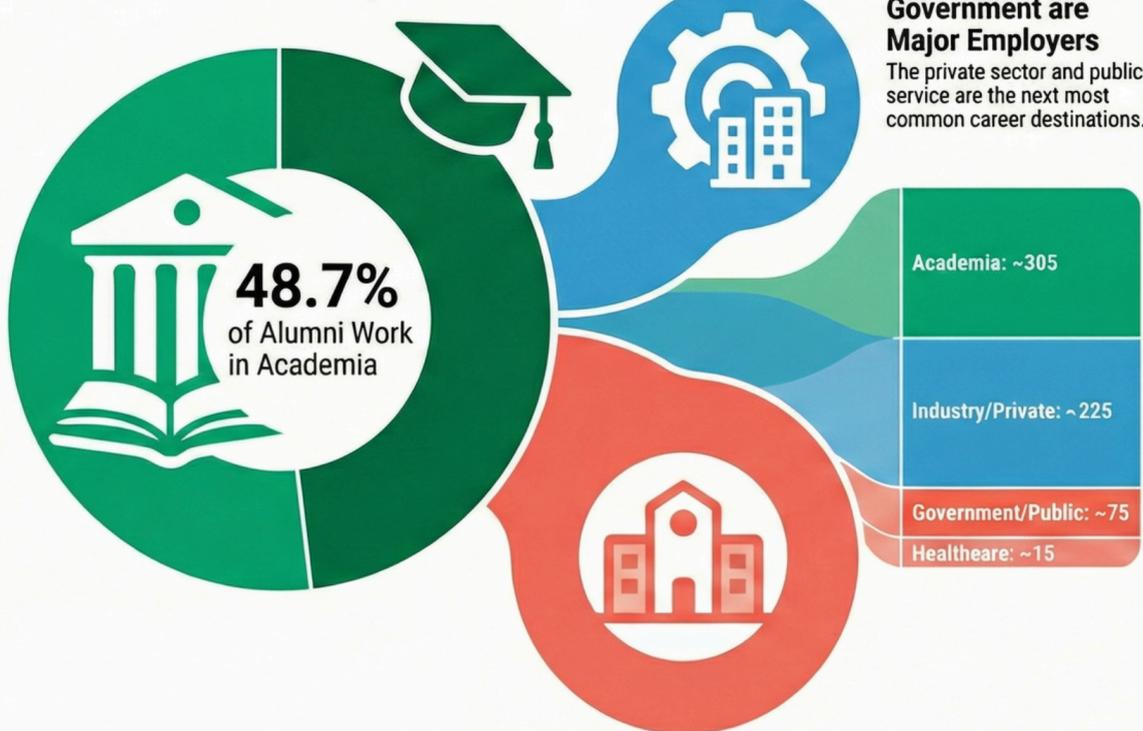


NotebookLM

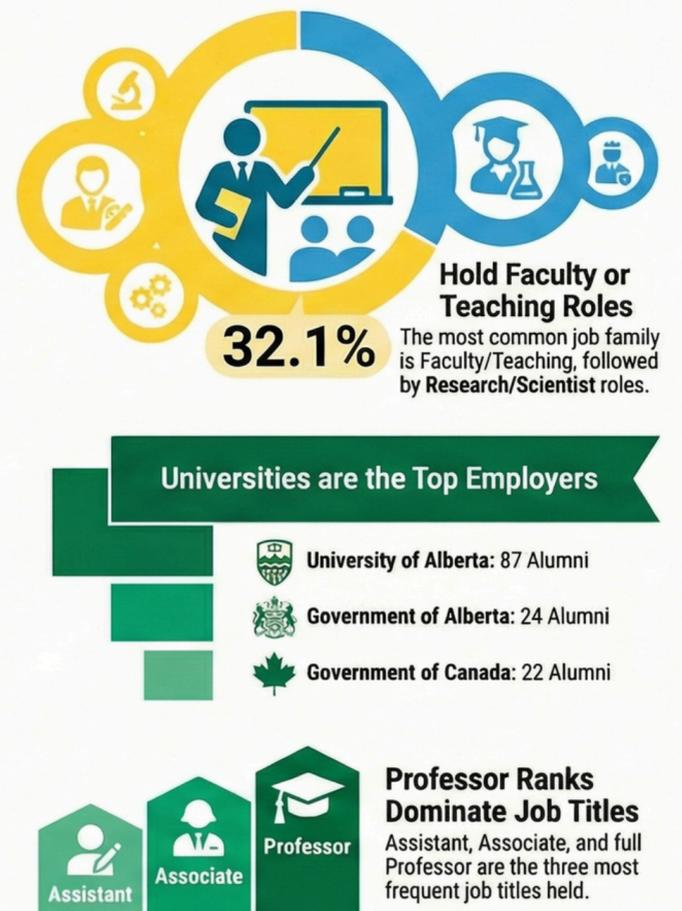
Career Pathways of Our PhD Alumni

A snapshot of employment outcomes for 630 PhD alumni as of December 2025, highlighting key sectors, job families, and top employers.

Where Alumni Work: Top Sectors



What Alumni Do: Roles & Employers



NotebookLM

On behalf of the Agricultural, Life and Environmental Sciences Graduate Students' Association (ALES GSA), it is my distinct pleasure and honour to welcome you to our annual conference. Seeing this space filled with such bright and passionate minds is a testament to the vibrant community we have built together. The decision to continue our academic journey and pursue a graduate degree is a profound one. It is a commitment fueled by curiosity, a drive to solve complex problems, and a deep-seated passion for the subjects that define our faculty: sustainable food systems, ecological integrity, community development, and the responsible stewardship of our natural resources. This conference embodies that commitment.

Gathering together like this is more than just a tradition; it is a vital part of the academic venture. It is here, outside the confines of our labs and libraries, that our research comes to life. Presenting your work, engaging in thoughtful dialogue, and being challenged by your peers is how we refine our ideas, broaden our perspectives, and forge the collaborations that will define the future of our disciplines. In a world facing increasingly complex challenges in food security, climate change, and social equity, this exchange of knowledge is not just important; it is essential. The work you are doing has the power to create real, positive change, and this conference is a crucial step in that process.

None of this would be possible without the incredible support we receive. I would like to extend our deepest gratitude to our sponsors. Your generous contributions help us create a platform for emerging researchers to share their vital work and connect with one another. We are truly grateful for your partnership. I also want to extend my sincere thanks to the Faculty of ALES. Your unwavering support of graduate students and our initiatives is the foundation upon which we can build events like this. To the Dean's office, the department staff, and our faculty members who mentor and encourage us every day: your commitment to our success does not go unnoticed. Thank you for fostering an environment where graduate students can thrive.

Finally, I want to thank each and every one of you, the presenters, the attendees, and the dedicated volunteers who have worked tirelessly to organize this event. You are the heart of the ALES GSA. I encourage you to ask questions, make connections, and celebrate the incredible research happening in our faculty.

Have a wonderful and inspiring conference!

Warmly,
Elsie Rebecca Osei
President,
ALES Graduate Students' Association



VP Communications

"Welcome to the ALES GSA 2026 Graduate Research Conference. It is a pleasure to see the dedication and collaboration of our ALES community come together in this event. Serving as Vice President of Communications has been a privilege, and I am grateful to be part of a team that made this conference possible. I hope this conference provides a platform for sharing ideas, building networks, fostering collaborations, and inspiring both current and future researchers."

Prithviraj V



VP Finance

Welcome to what I hope will be an enriching and memorable conference! As a fellow graduate student, it has been genuinely meaningful to help create a space that celebrates the curiosity, effort, and resilience behind our work in the Faculty of ALES. Volunteering as Vice President of Finances this year, I was grateful to work alongside generous sponsors, funders, and the Faculty of ALES, whose support made this gathering possible. Their investment goes far beyond this event. It affirms that our research, ideas, and futures are worth believing in. I hope these days encourage you to share your work with confidence, ask thoughtful questions, and connect with the people around you in ways that continue well after the conference ends. I wish you a thoughtful, energizing, and rewarding conference.

Dayani Patuwatha Withanage



VP Students Life

As the Vice President - Student Life, I am delighted to welcome you all to our 2nd ALES Graduate Research Conference. It has been wonderful experience working with the GSA team in putting this conference together. I look forward to learning about the diverse research ongoing in the different departments of our faculty. I am a fourth-year Soil Science Ph.D candidate in the Department of Renewable Resources under the supervision of Dr. Miles Dyck and Dr. Linda Gorim. My research focuses on exploring the soil health benefits of liming in the Canadian prairies. Being part of the ALES GSA has been life-changing, and I will forever be grateful for the opportunity to serve and contribute to the mandate of the association. I hope to continue making new connections with like-minded people. Outside the academics and resesarch, I enjoy crocheting, cycling, going on mini adventures and taking photos.

Regards

Priscillar Wenyika



HECOL REP

Welcome to the 2026 ALES Graduate Research Conference! As we celebrate another year of excellency in agriculture, environmental, and life sciences graduate research, I am reflecting on the incredible contributions of my colleagues and peers to the wide variety of knowledge fields our faculty represents. In my capacity as ALES GSA Awards Committee Chair, I have had the wonderful privilege of hearing firsthand how ALES students have benefited our communities and bettered our surroundings with every endeavour as researchers, mentors, parents, leaders, and coworkers. I wish you all the best in your presentations! Happy conferencing!

Zoe Wagner

AFNS REP

As the AFNS Department Representative, I warmly welcome you to the 2nd ALES GSA Research Conference. The preparations have been intense, but our incredible team has worked hard to make this event both meaningful and memorable. I believe this conference will be more than two days of presentations—it will be a space to share our work, exchange ideas, and grow into our identities as researchers. Research grows through community, and I am excited to support the ALES community in coming together.

Anubhav Tripathi



REES REP

"As the REES representative, I want to wish all our graduate students a successful conference. Presenting your work takes both courage and commitment, and I hope this conference offers you not only thoughtful feedback and engaging discussion, but also new connections and inspiration for the next stages of your scholarly journey. We are proud of your work and excited to support you."

Juan Andres Luchsinger

ReNR REP

It is my pleasure to welcome you to the ALES Graduate Research Conference 2025. Being part of this event has been a truly rewarding experience and a reminder of the strength of our academic community. This conference reflects the curiosity, dedication, and innovation that graduate students bring to research within ALES. I hope the conversations, presentations, and connections made here spark new ideas and collaborations. Thank you for being part of this inspiring gathering of scholars and researchers. Wishing you a successful, engaging, and enriching conference.

Lisa Naa Okai



ABOUT THE ALES GRADUATE CONFERENCE

For nine years, the ALES GSA has proudly hosted an annual event that brings together graduate students, faculty, and professionals from the Faculty of Agricultural, Life and Environmental Sciences (ALES). This faculty comprises four diverse departments: Agricultural, Food & Nutritional Science; Human Ecology; Renewable Resources; and Resource Economics and Environmental Sociology, each contributing to a rich and dynamic research community.

Building on this strong foundation, we entered a new chapter in 2025 by transforming our long-standing symposium into the ALES Graduate Research Conference. This evolution reflected our vision to expand the event's scope and impact, establishing it as a premier academic gathering within our faculty. Now, in 2026, we are thrilled to host the second annual ALES Graduate Research Conference, continuing this exciting tradition of growth and excellence.

The conference provides a vital platform for graduate students to showcase their research, engage in rigorous academic discussion, and foster interdisciplinary collaboration. This year's event will once again take place at the Lister Conference Centre, a spacious and dynamic venue designed to encourage networking and engaging dialogue. Attendees can expect an inspiring and productive experience, featuring keynote addresses from distinguished speakers and interactive workshops focused on developing essential academic and professional skills.

To conclude the event, we have organized a social dinner that brings together industry partners, faculty, and students in a relaxed setting to strengthen professional connections and celebrate the conference's success. We are delighted to have you join us for this milestone event as we continue to build a tradition of research excellence in ALES.

KEYNOTE SPEAKER

Conference Theme: Convergence: Cultivating Sustainable Futures Through Interdisciplinary Action

Date: 5th March 2026

Time: 9:30 am

Venue: Cascade Room, SUB Basement

DR. MEGAN STRICKFADEN

**Professor, Faculty of Agricultural, Life and
Environmental Sci - Human Ecology Dept**

Megan Strickfaden, PhD, is a design anthropologist and migrant who has lived in seven countries. She currently makes a home in Edmonton's University of Alberta at the Department of Human Ecology (Canada) and currently holds a position as an adjunct professor in the School of Fashion & Art Design, Donghua University (Shanghai). As a professor Megan solves complicated problems for people who live without sight, move around speedily on wheels, and/or process the world differently from others. She has carried out extensive anthropological research and fieldwork in the Netherlands, Belgium, the UK, Canada and China. Megan's areas of specific concern cover, but are not confined to, unpacking challenging problems such as designing specialized systems and networks with many stakeholders. She is interested in understanding human-object and human-environment relations, especially within the context of challenging social issues. Megan uses ethnographic and co-created film, curates exhibitions, and teaches design studies and material culture design to explore with and provoke change.



KEYNOTE SPEAKER

Conference Theme: Convergence: Cultivating Sustainable Futures Through Interdisciplinary Action

Date: 5th March 2026

Time: 10:00 am

Venue: Cascade Room, SUB Basement



DR. DEBRA DAVIDSON

**Professor, Faculty of Agricultural, Life
and Environmental Sci - Resource
Economics & Environmental Sociology**

Dr. Debra Davidson is Professor of Environmental Sociology in the Department of Resource Economics and Environmental Sociology at the University of Alberta. Debra began her career at the University of Alberta as Assistant Professor in 1999. Since that time, her teaching and research has been focused on the social impacts of and responses to climate change, with particular attention to energy-society relations. Recent research focused on the role of emotions in social responses to climate change is featured in her latest book, *Feeling Climate Change: How Emotions Govern Our Responses to the Climate Emergency* (Routledge, 2024). Her work is also featured in several journals, including *Science*, *Nature*, *Global Environmental Change*, and *British Journal of Sociology*. Between 2013 and 2023, she served as Director of Prairie Urban Farm, a community farm at the University of Alberta.

PROGRAM OVERVIEW DAY 1

SUB BASEMENT, 4th March 2026

ORION, JUNIPER AND MARIGOLD ROOMS

9:00 AM - 10:00 AM

Registration and Opening Remarks

10:00 AM- 12:00 PM

Oral Session 1 (Marigold Room)

12:00 PM- 1:15 PM

Lunch and Workshop (Career Center)

1:15 PM- 4:00 PM

Concurrent Oral Sessions 2

END OF DAY 1



PROGRAM OVERVIEW DAY 2 (Part 1)

SUB BASEMENT, 5th March 2026

CASCADE, JUNIPER AND MARIGOLD ROOMS

9:00 AM - 10:30 AM

Remarks and Keynote addresses

10:30 AM - 12:30 PM

Oral Session 1 (Marigold Room)

12:30 PM - 2:00 PM

Lunch and Poster Session (Cascade Room)

2:00 PM - 4:00 PM

Concurrent Oral Sessions 2

END OF DAY 2 (Part 1)

PROGRAM OVERVIEW DAY 2 (Part 2)

SUB BASEMENT, 5th March 2026

AWARDS GALA (CASCADE ROOM)

5:00 PM - 5:30 PM

Welcome and Opening Remarks

5:30 PM - 8 PM

Dinner, Networking and Awards Ceremony

8:00 PM - 8:30 PM

Closing Remarks

FULL PROGRAM DAY 1

SUB BASEMENT, 4th March 2026

ORION, JUNIPER AND MARIGOLD ROOMS

9:00 AM - 10:00 AM

Registration, Land Acknowledgement and Opening
Dr. Rene Dery
Director of Research and Innovation

ORAL SESSION 1- Marigold Room

10:00 AM- 10:20 AM

Anubhav Tripathi

10:20 AM- 10:40 AM

Priscillar Wenyika

10:40 AM- 11:00 AM

Laura Woodman

11:00 AM- 11:20 AM

Min Yuan

11:20 AM- 11:40 AM

KEXIN YANG

11:40 AM- 12:00 PM

SONIKA PARIYAR

12:00 PM- 1:15 PM

Lunch and Workshop (Career Center)

Concurrent ORAL SESSION 2- Juniper Room

1:20 PM- 1:40 PM

Sonia Navvuru

1:40 PM- 2:00 PM

Preston Tran

2:00 PM- 2:20 PM

Abouzar Karimi Jafari

2:20 PM- 2:40 PM

Domenic Marano

2:40 PM- 3:00 PM

Jedida Chirchir

Concurrent ORAL SESSION 2- Marigold Room

1:40 PM- 2:00 PM

Kethu Ubayarathna

2:00 PM- 2:20 PM

Boran Liu

2:20 PM- 2:40 PM

Longqin Li

2:40 PM- 3:00 PM

Ranine El-jurdi

3:00 PM- 3:20 PM

Damon Bectell

3:20 PM- 3:40 PM

Shubhashis Bhattarai

FULL PROGRAM DAY 2

SUB BASEMENT, 5th March 2026

CASCADE, JUNIPER AND MARIGOLD ROOMS

9:00 AM - 10:30 AM

Addresses and Keynote Speeches
Dr. Megan Strickfaden
Dr. Debra Davidson

ORAL SESSION 1- Marigold Room

10:30 AM- 10:50 AM

Reina Denisse Donis Salazar

10:50 AM- 11:10 AM

Vanessa Osei Bonsu

11:10 AM- 11:30 AM

Elias Rietzschel

11:30 AM- 11:50 AM

Haneen Alia Abraham

11:50 AM- 12:10 AM

Jill Thomson

12:10 AM- 12:30 PM

DOLAPO ADEPOJU

12:30 PM- 2:00 PM

Lunch and POSTER SESSION

Concurrent ORAL SESSION 2- Juniper Room

2:00 PM-2:20 PM

Luke H. Beattie

2:20 PM- 2:40 PM

Stella Scholastica Crowley

2:40 PM- 3:00 PM

Luis Miguel Salas Chia

3:00 PM- 3:20 PM

MOHRUKH TALABKHUJA

3:20 PM- 3:40 PM

Gabriel Barbosa Delmondes de Moraes

Concurrent ORAL SESSION 2- Marigold Room

1:20 PM- 1:40 PM

Nolan Johnson

1:40 PM- 2:00 PM

Shivani Sonkar

2:00 PM- 2:20 PM

Endriss Ali Umer

2:20 PM- 2:40 PM

Shekhar KC

2:40 PM- 3:00 PM

Wadumesthrige Navoda Hansini

FULL PROGRAM DAY 2 (GALA)

SUB BASEMENT, 5th March 2026

CASCADE ROOM

5:00 PM- 6:00 PM

Opening Remarks and networking

6:00PM-7:30 PM

Dinner

6:30 PM- 7:30 PM

Awards Presentations

7:30 PM-8:30 PM

Networking

8:30 PM

Vote of thanks and Closing



END OF DAY 2 (Part 2)

DAY 1
4th March

10:20 AM- 10:40 AM

Anubhav Tripathi

Impacts of breeding over the years on Canadian Brassica napus canola

10:40 AM- 11:00 AM

Priscillar Wenyika

Liming effects on microbial communities in Black and Grey soils of the Canadian Prairies

11:00 AM- 11:20 AM

Laura Woodman

Equitable Inclusion of HBCC in ECEC systems? A Comparative Review of Home- Based Child Care Across Six Countries

11:20 AM- 11:40 AM

Min Yuan

A Co-granulated Urea and Sulphur Fertilizer Reduces Soil N₂O Emissions while Increasing Crop Yields

11:40 AM- 12:00 PM

KEXIN YANG

Regional distributions of Plant Sexual Systems in temperate forests and the differential effects of Climate Change

12:00 PM- 12:20 PM

SONIKA PARIYAR

Zeolite-based seed coating as a management tool against Aphanomyces root rot in field pea

Concurrent ORAL SESSION 2- Juniper Room

1:20 PM- 1:40 PM

Sonia Navvuru

Genetic Architecture of Clubroot resistance in Brassica Napus Canola introgressed from B. OLERACEA.

1:40 PM- 2:00 PM

Preston Tran

Methanol to Lipids: Methylophilic Microorganisms as Sustainable Lipid Platforms

2:00 PM- 2:20 PM

Abouzar Karimi Jafari

Impact of dehulling and pressing temperature on the quality of canola meals and the resulting protein isolates

2:20 PM- 2:40 PM

Domenic Marano

Recycling Spent Single-Cell Protein Fermentation Media: Treatment and Characterization

2:40 PM- 3:00 PM

Jedida Chirchir

Long-term liming and nutrient management impact soil pH, crop yields, nutrient, and cation uptake in a cereal-forage rotation

3:00 PM- 3:20 PM

Kiran Khurshid

Processing with High-Intensity Ultrasound and Supercritical CO₂ for Cellulose-based Hydrogels and Aerogels

Concurrent ORAL SESSION 2- Marigold Room

1:40 PM- 2:00 PM

Kethu Ubayarathna

Soil Carbon Dynamics: Comparing Organic Carbon Composition in Podzolic and Luvisolic Subsoils from Canadian Forests

2:00 PM- 2:20 PM

Boran Liu

Greenhouse Gas Mitigation and Soil Microbial Responses to a Nitrapyrin-Based Nitrification Inhibitor in Western Canadian Barley Cropping Systems

2:20 PM- 2:40 PM

Longqin Li

CSR Strategies and the Factors Influence Plant Communities Along the Rural-Suburban-Urban Gradient

2:40 AM- 3:00 AM

Ranine El-jurdi

Control of Listeria in Mixed-species Biofilms

3:00 PM- 3:20 PM

Damon Bectell

Accumulation and Root Response of Cicer Milkvech-Dominated Pasture Under Different Harvest Regimes

3:00 PM- 3:20 PM

Shubhashis Bhattarai

Near-infrared spectroscopy (NIRS) calibration curve for predicting mixed plant species forage quality in Canadian Prairie rangelands"

END OF DAY 1

ORAL SESSION 1- Marigold Room

10:30 AM- 10:50 AM

Reina Denisse Donis Salazar

Intercropping Warm-Season Grasses with Sunn Hemp to Enhance Forage Productivity and Reduce Nitrogen Fertilizer Inputs in Beef Cattle Systems

10:50 AM- 11:10 AM

Vanessa Osei Bonsu

A critical analysis of The Parent and Grandparent Sponsorship Program reforms

11:10 AM- 11:30 AM

Elias Rietzschel

Rational Gene Stacking for Seed-Specific Carbon Partitioning to Simultaneously Enhance Lipid and Protein Contents in Canola

11:30 AM- 11:50 AM

Haneen Alia Abraham

Floors, Ceilings, and Gaps: How Does Parental Leave Design Shape Maternal Employment?

11:50 AM- 12:10 AM

Jill Thomson

Emergent landscapes: gardens and bicycles in cities; embodied engagement of mind/body/environment through art/craft making supported by interdisciplinary research with material culture studies.

12:10 AM- 12:30 PM

DOLAPO ADEPOJU

Enteric Methane Emissions Are Lower in Adaptive Multi-Paddock Grazing as Compared to Continuous Grazing in the Aspen Parkland Region of Alberta.

Concurrent ORAL SESSION 2- Juniper Room

2:00 PM-2:20 PM

Luke H. Beattie

Backyard Drivers of Urban Forest Dynamics: Tree Planting and Removal Motivations in a Small Alberta City

2:20 PM- 2:40 PM

Stella Scholastica Crowley

Cultural Diversity and Greenhouse Gas Emissions: Evidence from Canada

2:40 PM- 3:00 PM

Luis Miguel Salas Chia

Harvesting of Methylophilus methylotrophus AS1 Biomass at low centrifugal forces: Effects of Thermal and Acid Pretreatments

3:00 PM- 3:20 PM

MOHRUKH TALABKHUJA

Marginal Abatement Cost Curves for Methane-Reducing Practices in the Canadian Beef Sector

3:20 PM- 3:40 PM

Gabriel Barbosa Delmondes de Moraes

Implementation Science Frameworks in School Food Policy: A Global Scoping Review to Inform Alberta's Nutrition Investments

Concurrent ORAL SESSION 2- Marigold Room

1:20 PM- 1:40 PM

Nolan Johnson

Effect of Nitrification Inhibitor eNtrench on Soil Nitrogen Availability for Malt Barley Across Contrasting Prairie Soil-Moisture Regimes

1:40 PM- 2:00 PM

Shivani Sonkar

Enhancing the Antimicrobial Efficacy of Plasma-Activated Water Mist Using Chemical Antimicrobials and UV-A LED Treatment

2:00 PM- 2:20 PM

Endriss Ali Umer

Enhancing Cell Recovery during Single-Cell Protein Production: More Protein at Shorter Time

2:20 PM- 2:40 PM

Shekhar KC

Allelopathic and Competitive Effects of Annual Crops on Perennial Forage seed crops during Early Growth

2:40 PM- 3:00 PM

Wadumesthrige Navoda Hansini

Evaluation of the canola lines carrying resistance in the A and C genome for resistance to different Plasmodiophora brassicae pathotypes

DAY 2
5th
March

Umair Zahid

Protein Hydrolysis of Chicken Feet using Pressurized Hot Water and Pressurized CO₂ Media Assisted by Enzymes

Angie Nathalia Lizarazo Roman

From Methanol to Lipids: A Bioprocess Approach Using *Methylorubrum extorquens* OSD20 and *Auxenochlorella protothecoides* UTEX 256

Cole Vandemark

Comparative Genomic Analysis and Virulence-Associated Variation from Single-Spore Isolates of *Plasmodiophora brassicae*

Ranine El-jurdi

Control of *Listeria* in Mixed-species Biofilms

Leonardo Vieira Santos

Non-Target Effects of Insecticides on Alfalfa Weevil Predators

Reina Denisse Donis Salazar

Cover Crop Species Richness and Harvest Frequency Effects on Forage Responses in the Black Soil Zone of Alberta

Zachary Burgess-Akitt

Distribution of Alfalfa Weevil Deltamethrin Resistance on the Canadian Prairies

Nora Naji Alhulaimi

Extraction of phytochemicals from oat straw by conventional method

Sydney Wong

Sensitivity Screening of *Pyrenophora tritici-repentis* to Propiconazole and Pyraclostrobin fungicides and significance genetic resistance genes in durum wheat

Namuna Chapagain

UAV modeling of forage mass, depletion, and recovery across grazing systems in Alberta rangelands

Logan Snow

Evaluating the Susceptibility of *Medicago lupulina* to Members of the Pulse Root Rot Complex

Ifedayo Emmanuel Bello

Assessment Of “Green” Protein Extraction Techniques On Porcine Spleen Isolates As Valorization Option For Meat By-Products

Dayani Buddhika Maheshini, Patuwatha Withanage

Arbuscular Mycorrhizal Fungi Enhance Wheat Performance in Canola-Wheat Rotations: A Cultivar-Dependent Response in Alberta

Aayushi Rambia

Compost-Based Biostimulants for Sustainable Nutrient Management in Wheat-Canola Rotations

Emily Reitsma

Testing a Novel Kefir for Improved Blood Glucose and Microbiome in a Prediabetic and Diabetic population.

Felix Ayiera

Effects of Plasma-Activated Nanobubble Water and Ultrasound on Reactive Species and Biofilm Inactivation

Hamdi Ben Khelifa

Resistance of Joule Heating Textiles to Fatigue Bending

Carmen Hamel

There's No Place Like Home (дассан газрын даавуу зөөлөн, дундуур хэвтэр дулаан хотхон): Visualizing the Factors Contributing to Mongolian Herders' Land Loss

Jiaxun Li

Citizens' Preferences for Governance Design in Community Renewable Energy Projects: Evidence from a Discrete Choice Experiment in Alberta

Ashley Krehut

From Single-Use Plastics to Bioplastics: Examining the Implications of Bioplastics from the Perspective of Canadian Composting Facilities

Alessia Marchesan

N₂O and CO₂ Production from Intact Soil Cores across a Broad Range of Soil Conditions during the Transition to Organic Crop Management

L. Shea Giesbrecht

More wasps nest in artificial nests placed in treed crop borders than herbaceous crop borders

Shane Collins

Exploring Alternatives to Pre-Harvest Glyphosate in Spring Wheat

Johanna Olsson

Forestry in Sweden and Alberta; What can we learn from each other?

Payden MacDouall

Balancing Human and Wildlife Values: Is There a Significant Relationship between Visitorship and Changes in Wildlife Behaviour Within Canada's Parks and Protected Areas?

Coralie Jeanine Vollenweider

Assessing asynchrony and temporal stability of productivity in boreal aspen-spruce mixedwoods

Sally Ferrari

CRISPR/Cas9-immortalized bovine fibroblasts for cultivated fat production

Sydney Kennedy-Flynn

Effects of Amendments on the Anaerobic Bioremediation of Organohalides in Contaminated Soil and Groundwater

Ayomide Oladele

What drives greater fertility in dairy cattle with short anogenital distance?

Priya Dhital

Effect of Plant Growth Regulator and Seeding Rate Interaction on Barley Root and Shoot Parameters

Prithviraj V

Enhancement of the microbial biofilm inactivation efficacy of plasma-activated nanobubble water by UV-C and hydrogen peroxide

Damon Bectell

Sod-Seeding Perennial Legumes for Pasture Rejuvenation

Ashmita Timsina

Impact of Humic-Based Soil Amendments on Nitrogen Fixation and Growth of Dry Beans (*Phaseolus vulgaris* L.)

Mackenzie Robertson

Rethinking Wildfire Suppression in Alberta's Ecologically Sensitive Landscapes

Leah Feng

The Scale-Dependent Soil Spatial Asynchrony in Explaining Tree Diversity in a Subtropical Forest

Iyesha Madushani Wanigasinghe

Snap the Species: Comparing vascular plant species detection in plot-based surveys by experts versus photo surveys

Smriti Sharma

Effects of Capping Substrates and Beneficial Fungi, *Serendipita herbamans*, on Growth and Stress Physiology of Boreal Tree Species in Oil Sands Reclamation Sites

John Maverick De Leon

Big data and Soil Science: Integrating MID-FTIR Spectroscopy and Machine Learning Models to develop predictions for Soil Health Assessment

Kenneth Oraiz

From Waste to Treasure: Cement Kiln Dust Combined with Digestate and Humic Acid for Soil Improvement and GHG Mitigation

Wijelath Arachchige Gihan Erandika Wijelath

Sequential Pretreatment Strategies for Enhancing Protein Solubilization from Brewer's Spent Grain (BSG)

Taniya Madushani Nanayakkara Hettigoda Gamage

Ultrasound Processing to Improve Germination of Soybean Seeds

Joshua Cobbinah

Can Agriculture and Clean Energy Truly Coexist in Alberta? Producers' Perspectives on Agrivoltaics

Ranine El-jurdi

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AFNS Master 1st year

Control of *Listeria* in Mixed-species Biofilms

"Biofilm formation in food processing environments facilitates the persistence of *Listeria monocytogenes*, increasing the risk of contamination and foodborne illness outbreaks. Although *L. monocytogenes* is known to establish in mixed-species biofilms, the influence of microbial interactions on its persistence remains poorly understood. This study aimed to determine how bacterial community composition affects *L. monocytogenes* persistence within multi-species biofilms. Experiments were conducted using 32 non-redundant combinations derived from a five-member bacterial community isolated from a food processing facility. Multi-species biofilms were formed on stainless steel coupons, and biofilm biomass was quantified using crystal violet staining. *L. monocytogenes* cell counts were determined relative to coupon surface area using colony morphology differentiation. Pellicle and aggregate formation were visually assessed, and DNA pellets were collected for downstream analysis. Statistical analyses were performed to evaluate differences in *L. monocytogenes* growth across community combinations. *Carnobacterium maltaromaticum* significantly inhibited *L. monocytogenes* growth, likely through the production of bacteriocins or competitive interactions. In contrast, *Serratia liquefaciens* only reduced *L. monocytogenes* counts in the absence of *C. maltaromaticum*, suggesting limited inhibitory capacity when faced with dominant competitors. Pellicle and aggregate formations occurred only in combinations containing either *Pseudomonas shahriarae* or *Janthinobacterium tructae*. However, results from this study, along with previous findings, suggest *J. tructae* is the primary species responsible for producing structurally robust pellicles. In the complete 15-member community experiment, pellicle formation was absent in the most complex community, which contained a high number of *Pseudomonas* species, further supporting *J. tructae*'s role in pellicle development. These findings highlight the importance of microbial community composition in influencing *L. monocytogenes* persistence. Monitoring indicator species such as *C. maltaromaticum* or *S. liquefaciens* in food processing facilities can help predict and prevent *L. monocytogenes* establishment.

Keywords: *Listeria monocytogenes*; Mixed-Species Biofilms; Food Microbiology; Food processing facilities; Foodborne disease prevention"

Anubhav Tripathi

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Impacts of breeding over the years on Canadian *Brassica napus* canola

Significant improvements of Canadian *Brassica napus* canola have been made over the past decades through traditional plant breeding. The objective of this study was to evaluate the oilseed *B. napus* accessions from a gene bank, and canola breeding programs of an industry (private) and the University of Alberta (UofA, public). The pedigree of the UofA accessions largely included exotic germplasms such as winter canola and rutabaga, while the pedigree of the industry and gene bank accessions was not known. A total of 282 accessions from these three sources were evaluated for 32 morphological, agronomic and seed quality traits in four field trials in Alberta. Results indicate that breeding over time has improved canola for earliness of flowering, higher seed yield, oil content, sum of oil and protein contents, and reduced glucosinolate content. Among the three groups, the UofA accessions gave higher yield and had higher oil content. Of the UofA accessions, the 3rd and 4th cycle breeding materials developed from crosses involving winter canola and rutabaga gave higher yield and had higher oil and sum of oil and protein contents than those from spring × spring crosses, as well as the accessions from industry. This superior performance implies the need for multiple cycles of breeding to develop improved canola lines when using exotic germplasm in crosses, as well as highlights the need for a public-private partnership for efficient utilization of exotic gene pools in breeding.

Keywords: exotic germplasm; gene bank; genetic improvement; genetic diversity; public-private breeding"

Luis Miguel Salas Chia

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Harvesting of *Methylophilus methylotrophus* AS1 Biomass at low centrifugal forces: Effects of Thermal and Acid Pretreatments

"The conversion of methanol into microbial protein as single-cell protein represents an attractive biotechnological route for sustainable protein production. However, the small size of bacterial biomass produced during fermentation (~1 µm) makes its separation and recovery during downstream processing particularly challenging, limiting the applicability of conventional screening methods. As a result, centrifugation is commonly applied, although it often requires high operating forces. To reduce these requirements, biomass pretreatments can be applied to modify particle properties, either by increasing the effective density of the solids or by promoting cell aggregation, thereby increasing the apparent particle size and improving separation efficiency. In this context, this study investigates the effect of centrifugal force on biomass removal from the harvest broth under different relative centrifugal forces (50–5000 rcf) using bench-scale centrifugation. The process was evaluated using *Methylophilus methylotrophus* AS1 biomass grown in a 5 L fermenter, with steam shock (80 °C) applied as a strategy to modify the effective density of the solids and acidification (pH 3) used to promote cell aggregation. Biomass removal was quantified by measuring the total dry weight (TDW) of the supernatant after centrifugation.

Thermal pretreatment enhanced biomass removal at low rcf; however, its effectiveness decreased at higher rcf values, reaching a maximum removal of 64% ± 2, compared to 85% ± 3 for untreated samples. This behavior may be attributed to partial cell disruption, resulting in the release of intracellular components into the supernatant and increased measured TDW. In contrast, acidification significantly improved biomass separation, achieving approximately 66% ± 4 removal at 100 rcf and 85% ± 2 removal at 150 rcf, likely due to enhanced cell aggregation and increased apparent particle size.

These findings demonstrate that simple pretreatments can substantially reduce centrifugal force requirements, enabling more efficient bacterial biomass harvesting at low rcf and short residence times."

Keywords: Biomass, Separation, Centrifugal force, Steam treatment, Acid treatment

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GENETIC ARCHITECTURE OF CLUBROOT RESISTANCE IN BRASSICA NAPUS CANOLA INTROGRESSED FROM B. OLERACEA

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Clubroot disease, caused by *Plasmodiophora brassicae*, poses a threat to *Brassica napus* canola production in Canada. Canola breeders have widely used the major clubroot resistance (CR) genes of the Brassica A genome to develop clubroot resistant cultivars; however, these genes lose their effectiveness after growing a cultivar only a few years. In contrast, the CR of the C genome of *B. oleracea* offer a broader protection against diverse *P. brassicae* pathotypes; however, this resistance remains underutilized in canola breeding. We have developed several canola lines (F10) carrying CR of *B. oleracea* through *B. napus* × *B. oleracea* var. *acephala* interspecific cross. The objective of this research was to understand the genetic control of this resistance in canola. For this, 252 F10 plants descended from 14 resistant and five partially resistant F9 families were evaluated for resistance to *P. brassicae* pathotype 3H and three resistant families were selected. Twelve F11 plants belonging to the three resistant families exhibiting low Disease Severity Index (DSI, 0.00-6.67%) were crossed with a susceptible canola line and F1 seeds were produced. The F1 plants were self-pollinated to produce F2 populations. Evaluation of the F1 plants for resistance to pathotype 3H revealed a high DSI (97.28%), indicating that resistance is likely controlled by recessive genes. In F2, 92.50% of the plants were susceptible (disease score = 2 or 3) indicating that the resistance is likely controlled by multiple genes. In addition to this, evaluation of 280 recombinant inbred lines (RILs), developed from these crosses, against pathotype 3H revealed only 3.61% of the RILs to be resistant further supporting the involvement of multiple loci in the control of this trait. Thus, the results from this research provide a foundation for utilizing the CR genes of the C genome of *B. oleracea* in the breeding of *B. napus* canola.

Keywords: Clubroot resistance; *Brassica oleracea*, *Brassica napus*; inheritance; breeding

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Methanol to Lipids: Methylophilic Microorganisms as Sustainable Lipid Platforms

Global efforts have focused on the development of sustainable sources of fuels, chemicals, and materials. Lipids are a versatile feedstock, offering a renewable source of carbon that can be converted into commodities like biofuels. Fatty acids have been investigated in lipid pyrolysis technology to produce fatty acid-derived biofuels. Microorganisms present an exciting platform for biofuel production due to their low environmental footprint, genetic engineering potential, and broad substrate range. Methylophilic, which can utilize methanol as a carbon source, are particularly promising because methanol is abundant, cost-effective, and can be produced renewably. An environmental isolate of a *Hyphomicrobium* species (OSCF32) has shown to accumulate lipids and consume methanol. However, carbon storage through polyhydroxyalkanoate (PHA) accumulation competes with lipid synthesis, as these pathways share metabolic intermediates. This research aims to address these challenges through three objectives: modifying growth parameters to influence lipid profiles of OSCF32, developing a genetic toolkit for OSCF32 and engineering OSCF32 for increased lipid production. Changing growth variables like pH can provide insight on how a multi-faceted approach (both genetic modifications and growth conditions) can be used to achieve high lipid production. For the first objective, biomass was cultured in shake flasks, harvested then transferred to media with pH adjustments. Lipids were extracted and analyzed using gas chromatography. A pH of 6.4-6.5 exhibited the highest lipid accumulation, nearly double the lipid content when compared to pH 6.8 (control). At a pH < 6.3, no PHA accumulation was observed, generating a purer fatty acid feedstock. By creating an OSCF32 mutant for lipid production, we can develop a viable, sustainable approach for lipid-derived biofuels from methanol as a carbon source and position Canada as a leader in sustainable energy solutions and offering practical solutions for a cleaner future in Canada and the rest of the planet.

Keywords: Methanol; lipids; biofuels; methylophilic bacteria; metabolic engineering

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Impact of dehulling and pressing temperature on the quality of canola meals and the resulting protein isolates

Canola hulls are rigid structures rich in lignocellulosic polymers and tannins. With the growing demand for sustainable proteins and advances in dehulling technology and hull utilization, dehulling canola seeds before pressing could be a viable way to improve meal and protein quality. This study examined the combined effects of dehulling and pressing temperature (40, 80, and 120 °C) on canola meals and their derived protein isolates. The removal of 80-85% of hulls reduced heat-induced aggregation and preserved more of the meal's native microstructure during pressing, especially at 120 °C. Moreover, the secondary and the tertiary structure of meal proteins were better preserved, particularly under higher treatment temperatures. These improvements were attributed to the reduction of friction-induced effects and covalent modifications of proteins during the press resulting from dehulling. The above-mentioned observations directly corresponded with protein extraction efficiency values under alkaline (pH 11) and salt (0.8 M NaCl) conditions. Dehulling significantly increased extraction efficiency of alkaline and salt isolates by an average of 10.49% and 8.12%, respectively, with the differences between non-dehulled and dehulled meals becoming more pronounced as the pressing temperature increased. SE-HPLC analysis associated these improvements with higher extraction of unfolded cruciferins and aggregates from dehulled meals, particularly under alkaline conditions. Furthermore, hull-induced unfolding of the secondary structure of meal proteins likely promoted their precipitation during extraction, whereas changes in tertiary structure were less detrimental to extraction efficiency. Overall, dehulling improved canola meal structural preservation and protein thermal stability during the press, and isolate extraction efficiency and protein content.

KEYWORDS: Canola/rapeseed; Dehulling; Heat treatment; Canola meal characterization; Protein extraction

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Recycling Spent Single-Cell Protein Fermentation Media: Treatment and Characterization

Spent fermentation media represents a substantial waste stream in bioprocessing and as fermentation scale increases, disposal of this liquid stream presents a growing economic and environmental burden. This work investigates whether spent fermentation media from the production of single cell protein (SCP) can be repurposed as a recyclable feedstock through targeted characterization and treatment.

SCP harvest material was subjected to a sequential treatment process consisting of flocculation and centrifugation for separation of the SCP product from the spent media, tangential flow filtration for spent media clarification, and granular activated carbon adsorption for the removal of residual organic compounds. The resulting liquid fractions were fully characterized to track changes in bulk composition and organic matter.

The results demonstrate highly effective removal of cell debris and residual organic material across flocculation, filtration, and adsorption treatments. Elemental analysis confirms that essential inorganic nutrients remain largely conserved throughout the process, with only minor alterations in select cation concentrations compared to fresh media.

Parallel shake-flask and bioreactor trials are planned to compare microbial growth and protein production in fresh versus recycled medium after each treatment step, with and without targeted nutrient re-supplementation. Together, these experiments aim to identify which treatment steps are necessary and sufficient to restore or maintain suitable media quality, and at what point additional processing may otherwise offer diminishing returns. Developing strategies to reuse this spent media serves to reduce the operational costs and environmental impact of SCP production, providing a circular approach to waste stream management.

Keywords: Fermentation; Single-Cell Protein; Spent media; Recycling; Valorization

Reina Denisse Donis Salazar

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Intercropping Warm-Season Grasses with Sunn Hemp to Enhance Forage Productivity and Reduce Nitrogen Fertilizer Inputs in Beef Cattle Systems

"This study evaluated the potential of intercropping warm-season grasses, millet (*Pennisetum glaucum*) and sorghum-sudangrass (*Sorghum bicolor* × *S. arundinaceum*, cv. Cow Conditioner), with Sunn hemp (*Crotalaria* spp.); two Sunn hemp cultivars (*Crotalaria juncea* 'Crescent Sunn' and *C. ochroleuca* 'Red Sunn Hemp Mini') were assessed. A two-year field experiment (2025–2026) was established in the Black Soil Zone of central Alberta using a split-plot randomized complete block design with four replicates. Cropping system, including unfertilized grass monoculture, grass monoculture fertilized with 50 kg N ha⁻¹, and grass-Sunn hemp intercrop was assigned to main plots. Subplots consisted of two harvest timings based on crop phenological stage (flowering to soft-dough stages for sorghum and soft-dough to hard-dough for millet). Measurements included forage biomass accumulation, canopy height, light interception, and leaf-to-stem ratio. Preliminary results from 2025 showed that forage accumulation was strongly influenced by cropping system and harvest timing for both species ($P < 0.001$). In millet, delayed harvest resulted in greater biomass, with fertilized and unfertilized monocultures producing the highest yields (≈12,600–13,100 kg DM ha⁻¹), while Sunn hemp intercrops yielded approximately 20–30% less biomass. Similarly, sorghum-sudangrass produced greater biomass under later harvest (≈16,900 kg DM ha⁻¹) compared with earlier harvests (≈12,000 kg DM ha⁻¹), with monoculture and fertilized systems outperforming intercrops. Canopy height and light interception were significantly affected by cropping system and harvest timing ($P < 0.001$); Sunn hemp intercrops exhibited slower early-season canopy development but exceeded 90% light interception later in the season. Leaf-to-stem ratio declined with delayed harvest ($P < 0.0001$) and was unaffected by cropping system. These results suggest that, under Alberta conditions, warm-season grass monocultures; particularly under delayed harvest, maximize forage yield, while Sunn hemp intercropping may contribute more to canopy development and potential nitrogen inputs from biological fixation.

Keywords: forage systems, Sunn hemp, nitrogen fixation, intercropping, beef sustainability.

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Rational Gene Stacking for Seed-Specific Carbon Partitioning to Simultaneously Enhance Lipid and Protein Contents in Canola

"*Brassica napus* L. (canola) is a major global oilseed crop, and its protein-rich meal is widely used in feed and food applications. However, the high fiber content of canola meal, accounting for approximately one-third of its composition, limits digestibility and reduces overall nutritional value. In black-seeded cultivars, which dominate Canadian production, cellulose constitutes a substantial fraction of seed fiber, presenting an opportunity to improve seed quality through targeted carbon reallocation. Increasing global demand for plant-derived protein and oil further underscores the need to overcome the inherent trade-off between these two storage compounds. To address this challenge, we used *Arabidopsis thaliana* as a rapid screening platform to evaluate rational gene stacking strategies before deploying them in canola. A three-component approach was implemented: RNA interference-mediated downregulation of CELLULOSE SYNTHASE 1 (*AtCESA1*) to reduce cellulose biosynthesis, overexpression of *B. napus* DIACYLGLYCEROL ACYLTRANSFERASE 1 (*BnDGAT1*), and overexpression of genes associated with amino acid transport and protein biosynthesis (*AtAAP1*, *AtALAAT1*, and *AtASN1*). Multiple gene combinations were assessed for their effects on seed composition and yield-related traits. Among the tested lines, the *AtCESA1*-RNAi/L441P-*BnDGAT1*-OE/*AtAAP1*-OE combination exhibited the most favorable phenotype, showing a 19.5% relative increase in crude seed protein, a 3.9% increase in total lipid content, and a 32.2% reduction in cellulose compared to the empty vector control. These compositional changes were accompanied by increased seed yield and reduced individual seed weight. Preliminary analyses of T2 transgenic canola seeds indicate that these trends translate to *B. napus*, with confirmed increases in seed protein and oil content. Selected lines have advanced to the T3 generation for comprehensive characterization of oil, protein, cellulose, and lignocellulose. Overall, this study demonstrates that rational gene stacking can effectively redirect carbon allocation to improve seed quality traits, providing a promising strategy for developing value-enhanced canola germplasm for feed and food applications.

Keywords: Carbon reallocation; Gene stacking; Seed protein; Oil biosynthesis; Canola

Jedida Chirchir

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AFNS PH.D. 4th

Long-term liming and nutrient management impact soil pH, crop yields, nutrient, and cation uptake in a cereal-forage rotation

Jedida Chirchir (1)*, Miles Dyck (2), and Linda Yuya Gorim (1)

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Soil acidification is a significant threat to agricultural productivity worldwide. Historically, soil pH has not been a widespread concern in cropping systems in western Canada, but soil pH decline has been documented and may be accelerated in diverse, intensive cropping systems. This study quantified the long-term effects of liming and nutrient management on soil acidification (soil pH), soil N stocks, marketable yields, crop nitrogen, phosphorus, and cation (Ca, Mg, K, Na) uptake in alfalfa-brome forage, wheat, and oats grown in a long-term cereal-forage rotation at the University of Alberta Breton Plots from 1980 to 2020. Grain protein (%) and N surplus (applied N – grain N, kg N ha⁻¹) were also response variables for wheat and oats. Long-term nutrient management treatments included 1) Check (no fertilizer Control), 2) Manure, 3) NPKS synthetic fertilizer, and 4) PKS synthetic fertilizer with and without lime applications to maintain soil pH between 6.0 and 6.5. Alfalfa-brome average marketable yield, N, P, and cation uptake (associated with biological N fixation) were significantly greater when lime was applied with NPKS and PKS, and were linked to significantly greater wheat and oats N uptake in these treatments when lime was applied. In the Check and Manure nutrient management treatments, lime applications did not significantly affect marketable yields, N, cation uptake in all crops, or protein and N surplus (wheat and oats). Soil acidification rates, measured as declines in soil pH over time, were much greater in the synthetic fertilizer treatments (NPKS, PKS) than in the Manure and Check treatments, whether with or without lime, and were attributed to alfalfa root proton release associated with cation uptake. Cation exports in alfalfa-brome were much greater than those in the cereal crops and caused steady reductions in soil buffering capacity in the NPKS and PKS treatments, but not in the Manure treatment, where cations from salts in the manure were applied along with nutrients. Overall, the results presented here suggest that soil acidification rates have likely increased with the intensification and diversification of crop rotations, coinciding with the widespread adoption of conservation tillage and direct seeding in western Canada.

Keywords: Long-term, Breton Plots, liming, nutrient management

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Effect of Nitrification inhibitor eNtrench on Soil Nitrogen Availability for Malt Barley Across Contrasting Prairie Soil-Moisture Regimes

"The rapid nitrification of surface-applied urea leads to asynchrony between nitrogen (N) availability and crop demand, a challenge addressed by enhanced efficiency fertilizers. This study is the first to evaluate the nitrification inhibitor nitrapyrin (eNtrench) in Alberta barley systems. The objective was to compare soil ammonium (NH₄⁺) and nitrate (NO₃⁻) dynamics from urea with and without eNtrench at recommended (RR) and reduced (70% RR) rates under the contrasting irrigated (Lethbridge) and rainfed (St. Albert) conditions of the Canadian Prairies. In-band soil samples (0-15, 15-30 cm) were collected eight times during the growing season to assess total accumulated N, temporal patterns, and specific contrasts. Preliminary first-season results reveal contrasting site responses. At Lethbridge, eNtrench significantly increased seasonal NH₄⁺ accumulation compared to urea alone. At St. Albert, NH₄⁺ was influenced more by fertilizer rate than inhibitor, with both full-rate treatments exceeding the reduced rate with eNtrench. However, eNtrench enhanced NH₄⁺ retention at key growth stages (BBCH 31) at St. Albert, showing a temporal treatment effect. Nitrate dynamics also differed by site. Lethbridge showed clear treatment effects: seasonal NO₃⁻ from the 100% urea treatment was significantly higher than the reduced rate with eNtrench and numerically, but not significantly, higher than 100% urea with eNtrench. At St. Albert, both full-rate treatments produced similar NO₃⁻ levels and subsoil NO₃⁻ was minimal across all treatments, indicating lower leaching potential. These contrasting results suggest that site-specific soil and environmental conditions significantly influence eNtrench efficacy and N transformation patterns. These are preliminary findings from the first of three growing seasons. These results are based on the first of 2 growing seasons; therefore, no conclusions can be drawn.

Keywords: Plant available nitrogen dynamics, Nitrification Inhibitor, Urea, Barley, Alberta

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Forage Accumulation and Root Response of Cicer Milkvech-Dominated Pasture Under Different Harvest Regimes

Food demand is rising globally, necessitating increased sustainable food production. Increasing the productivity and nutritional value of pastures facilitates faster livestock growth and more efficient meat production. Cicer milkvech (*Astragalus cicer* L.) is a productive legume with high protein concentration. Unlike many other forage legumes, cicer milkvech does not cause frothy bloat, allowing greater use in grazing lands. Previous research focused on cicer milkvech yield under different harvest parameters; however, belowground responses of cicer milkvech-dominated pasture to different defoliation regimes are unstudied. Three defoliation intensities (5, 10, and 15 cm stubble height) and three defoliation frequencies (1, 2, or 4 times per growing season) were applied in a 3 x 3 factorial arrangement laid in a randomized complete block design with four replicates. Herbage accumulation was estimated using subsamples clipped from 1 m² quadrats placed within each plot. Belowground biomass was collected three times per year using a golf-hole cutter. New growth of roots-rhizomes was evaluated using ingrowth cores incubated throughout the growing season. Total herbage accumulation was significantly higher in the 5 cm defoliation treatment (P = 0.09) than in the 10 cm or 15 cm treatments. There were no significant differences in total herbage accumulation between defoliation frequency treatments (P > 0.1) or for the intensity x frequency interaction (P > 0.1). Differences in belowground biomass between treatments were not significant (P > 0.1). However, belowground biomass was significantly higher in July than in May or October (P < 0.01). There was no difference in root growth from the ingrowth cores (P > 0.1). The results of this study indicate that cicer milkvech-dominated pasture is adapted to different defoliation intensities and frequencies, making grazing planning of these fields flexible.

Keywords: *Astragalus cicer*; legume; defoliation; ingrowth core; rhizome

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Enhancing the Antimicrobial Efficacy of Plasma-Activated Water Mist Using Chemical Antimicrobials and UV-A LED Treatment

Plasma-activated mist (PAM) is an emerging non-thermal decontamination technology that combines cold plasma chemistry with the mass-transfer characteristics of fine liquid aerosols. However, the limited lifetimes of reactive species remain a challenge. To overcome this limitation, this study investigates the enhanced effects of PAM in combination with chemical sanitizer solutions, including peracetic acid (PAA) and hydrogen peroxide (H₂O₂) at different concentrations, and ultraviolet (UV-A, 365 nm) light emitting diode (LED) treatment for enhanced microbial inactivation.

Dual-strain *Escherichia coli* (*E. coli* 8-77 and *E. coli* AW 1.7) biofilm was grown on stainless steel 304 coupons and used to evaluate antibiofilm efficacy. Chemical solutions of PAA (10 and 100 ppm), H₂O₂ (30 and 300 ppm), and their combination were treated with plasma bubbler for 10 min and subsequently atomized PAM. The biofilm coupons were treated with PAM for 10 min, and with UV-LED for 10 min. To quantify the total biomass reduction on the biofilm coupon, crystal violet assay was performed. The concentrations of reactive oxygen and nitrogen species (RONS) in PAM were quantified using spectrophotometer. In addition, physicochemical properties were analyzed.

A significant enhancement in antimicrobial efficacy ($p < 0.05$) was observed for the PAM produced from PAA+H₂O₂, combined with UV-A treatment (3.23 log reduction in *E. coli* biofilm cells) compared with individual treatments. The enhanced antibiofilm efficacy of the combined treatment was attributed to the increased concentration of H₂O₂ species by plasma and UV-A radiation. In addition, PAA and H₂O₂ enhanced total biomass reduction capability of PAM. Lower pH and higher oxidation-reduction potential increased the affinity of the inactivation reaction between biofilm cells and reactive species. This study demonstrated that PAA, H₂O₂, and UV-A can substantially enhance the antibiofilm efficacy of PAM while minimizing residue and chemical demand during disinfection.

Keywords: Cold plasma, UV A LED, Plasma activated mist, Chemical treatment, Microbial disinfection

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Allelopathic and Competitive Effects of Annual Crops on Perennial Forage seed crops during Early Growth

The benefits of diversified forage-crop systems rely on careful selection of compatible crop species. Perennial forages such as alsike clover (*Trifolium hybridum* L.), perennial rye (*Lolium perenne* L.), creeping red fescue (*Festuca rubra* L.), and timothy (*Phleum pratense* L.) are increasingly considered for intercropping with annual crops including canola (*Brassica napus*), wheat (*Triticum aestivum*), oats (*Avena sativa*), and pea (*Pisum sativum*). However, the early establishment of these perennial forages, potentially influenced by allelopathic and competitive effects from co-planted annuals, remains understudied. A greenhouse study was conducted to characterize potential stress pathways affecting establishment and early growth of perennial forages. Two complementary experiments were arranged in randomized complete block design. The first involved sole perennial forage plants grown in pots and exposed to root leachates from separately grown annual crops to assess allelopathic effects. The second experiment involved binary intercropping of perennial forages with each of these annual crops in pots to capture combined allelopathic and resource competition effects. Each treatment combination included multiple potted plants across four replicates. Plant responses were monitored for oxidative stress (malondialdehyde, MDA assay), photosynthetic performance (effective quantum yield of photosystem II, Φ_{PSII}), gas exchange (stomatal conductance), and optical stress indices (photochemical reflectance index, PRI; normalized difference vegetation index, NDVI) alongside growth traits. Data collection and analysis are ongoing. The results will elucidate differential compatibility of perennial forages with annual crops under intercropping scenarios, informing potential strategies for sustainable forage-crop production.

Keywords: Perennial forage; annual crops; allelopathy; intercropping; early growth; physiological stress

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Oral

Enteric Methane Emissions Are Lower in Adaptive Multi-Paddock Grazing as Compared to Continuous Grazing in the Aspen Parkland Region of Alberta.

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Enteric methane (CH₄) emissions from beef cattle contribute to global warming and reduce feed energy efficiency. Feed additives can reduce methane emissions but often have temporary effects in grazing systems. Therefore, this study provides an alternative approach by comparing methane emissions from cows in Adaptive Multi-Paddock (AMP) and Continuous (CON) grazing systems. The experiment was conducted at the Kinsella Research Ranch, University of Alberta, involving 181 Kinsella Composite cows and 182 calves. Cattle were allocated to AMP and CON treatments across six paddocks (AMP: K1, K3, K5; CON: K2, K4, K6), stratified by age, body weight, and genomic expected progeny difference for residual feed intake. Methane was measured in two paddocks: K1 (n=36) and K2 (n=26) using GreenFeed (C-Lock Inc., Rapid City, SD) and compared across 5 grazing periods (14 consecutive days each). K2 Cows had unrestricted paddock access throughout the trial, whereas K1 cows rotated across 10 sub-paddocks in two phases: fast rotation (2-4 days) and slow rotation (5-6 days). Linear mixed-effects models were used to analyze CH₄ data, with treatment, period, and the treatment-by-period interaction as fixed effects and cow as a random effect.

Methane emissions varied across periods and differed by grazing system. Across the trial, AMP cows emitted 9.5% less methane than CON cows ($p=0.0141$). During fast rotation, cows emitted lower absolute mean enteric methane emissions (29.37g/d) than during slow rotation ($p<0.0001$). Methane also varied by time of day ($p<0.001$), differed between treatment groups ($p=0.03$), and showed a grazing system-by-time interaction (all $p<0.0013$).

Our results indicate that grazing management influenced enteric methane emissions in the Kinsella cow-calf system. AMP grazing appears to be an accessible pasture-based strategy for enteric methane mitigation and should be evaluated across years and sites in Canada.

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Near-infrared spectroscopy (NIRS) calibration curve for predicting mixed plant species forage quality in Canadian Prairie rangelands

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Near-infrared spectroscopy (NIRS) offers a rapid, low-cost alternative to wet chemistry for forage quality assessment, but robust calibrations for species-diverse native and tame grasslands remain limited. We developed and independently validated NIRS calibrations for 15 forage quality traits using >2,000 dried and milled mixed species forage samples collected from pastures across Alberta and Saskatchewan and across multiple years (2021–2025). Each sample was analysed for neutral detergent fibre (NDF), acid detergent fibre (ADF), lignin, nitrogen (N), carbon (C), fat, ash, dry matter (DM), and derived indices (crude protein, hemicellulose, cellulose, total digestible nutrients (TDN), total organic matter (TOM), moisture, non-fibre carbohydrates (NFC)) using standard wet-chemistry procedures. Samples were then scanned (400–2500 nm, 0.5 nm intervals) with a FOSS DS3 Near infrared spectrometer. We systematically evaluated combinations of common spectral preprocessing (mean-centering, standard normal variate, detrending, Savitzky–Golay first/second derivatives and their combinations) and regression frameworks (conventional PLS and Gamma-family PLS with identity and inverse links). Latent factors from PLS models were chosen by 10-fold cross-validation, followed by a 70/30 calibration–validation split for independent testing. Across the 15 traits, with the best model’s validation efficiencies (EF) ranged from 0.57 to 0.94, with a median EF of 0.79 (interquartile range \approx 0.67–0.87). NDF, N, crude protein, hemicellulose, cellulose, NFC, ADF and TDN showed particularly strong performance, with high EF and adjusted R^2 , low RMSEP, near-zero bias and no negative predictions. Moisture, DM, ash and C achieved more moderate EF but small absolute errors, supporting cautious quantitative use and confident ranking. Overall, these results demonstrate that a single, regional, mixed-species NIRS calibration provide reliable predictions of prairie forage quality, substantially reducing reliance on slower, more costly and reagent-intensive laboratory analyses.

Keywords: acid detergent fiber; grassland; lignin; neutral detergent fiber; nitrogen; protein; partial least squares; spectral preprocessing

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Implementation Science Frameworks in School Food Policy: A Global Scoping Review to Inform Alberta’s Nutrition Investments

As governments expand investments in school nutrition, translating policy into sustainable practice requires theoretically grounded implementation strategies. Although school food policies have proliferated globally, limited synthesis exists regarding how implementation science (IS) frameworks are applied to guide, evaluate, and sustain these initiatives. With Alberta advancing new financial commitments to school nutrition, examining global implementation approaches is both timely and policy-relevant. Objective: To systematically map the use of implementation science frameworks in school food policy research worldwide, identify methodological trends, and highlight strategic gaps with implications for Alberta. Methods: A scoping review was conducted following Joanna Briggs Institute methodology and reported in accordance with PRISMA-ScR guidelines. A comprehensive search strategy, developed with a health sciences librarian, was applied across eight databases (including MEDLINE and CINAHL). Two independent reviewers conducted screening and data extraction. Findings were synthesized descriptively and thematically to examine framework application, implementation phases, and contextual patterns. This study is funded by the Brazilian Government (CAPES/CNPq) through an international doctoral fellowship focused on transnational knowledge translation. Results: Ninety-five studies representing 33 countries, in addition to global-level analyses, were included, predominantly from the United States, Canada, and Australia. Twelve implementation frameworks were identified, with CFIR, RE-AIM, and the Theoretical Domains Framework most frequently applied. Research has increasingly shifted toward multi-level, systems-oriented, and hybrid effectiveness–implementation designs. However, important gaps remain, including limited evidence from low- and middle-income countries, minimal focus on de-implementation of ultra-processed food practices, and insufficient attention to long-term sustainability and equity outcomes. Conclusions: The predominance of high-income country evidence enhances the relevance of these findings for Alberta. Framework-guided, equity-oriented, and sustainability-focused strategies will be essential to translate provincial investments into durable, system-level transformation.

Keywords: Implementation science; Nutrition Policy; Diffusion of Innovation; Health Equity; Program Evaluation.

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Evaluation of the canola lines carrying resistance in the A and C genome for resistance to different Plasmodiophora brassicae pathotypes

Clubroot disease, caused by Plasmodiophora brassicae, is a threat to canola (Brassica napus) production in Canada. Management of this disease is challenging due to the presence of multiple pathotypes and frequent shifts in pathogen population structure in a field. The objective of this study was to evaluate 14 canola lines carrying resistance of the winter canola cv. Mendel, rutabaga cv. Brookfield, Chinese cabbage cv. Bilko, and turnip cv. Debra in the A genome, and 6 canola lines carrying resistance of B. oleracea in the C genome, and their 26 F1 hybrids for resistance to different P. brassicae pathotypes (3A, 3H, 3D, 5X, 5L, 5O, 5G, 5I, 8P, 8E, 8N, 8A, 9E, 2B, and 2C). In addition to this, histopathological investigation was carried out on the parents and their F1’s to understand the resistance mechanisms at the cellular level. Among the canola lines carrying resistance in the A genome, the resistance derived from the cv. Bilko was least effective against these pathotypes (average disease severity index, DSI = $74.2 \pm 4.3\%$); all other showed a similar level of resistance (average DSI = $31.4 \pm 5.07\%$ to $36.9 \pm 1.9\%$). The average DSI of the canola lines carrying the C genome resistance was $0.6 \pm 0.3\%$, which was higher than the canola lines carrying resistance in the A genome. The average DSI of the F1’s was $23.5 \pm 5.8\%$. Histopathological analysis of the parents and their F1’s is in progress, and the results will be presented. The result from this research is expected to extend our knowledge on the Brassica A and C genome resistances for use in breeding for the development of improved clubroot resistant canola cultivars.

Key Words: Clubroot; Plasmodiophora brassicae; Breeding for resistance; Pathotypes: Brassica A and C genomes

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Zeolite-based seed coating as a management tool against *Aphanomyces* root rot in field pea

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Field pea (*Pisum sativum* L.), is an important pulse in Canadian prairie crop rotations. It plays a crucial role in nitrogen fixation, and breaks disease cycles of major crops such as wheat and canola. It is susceptible to root diseases, especially the Pea Root Rot complex (PRRC). Out of the various pathogens involved in PRRC, *Aphanomyces euteiches* Dreches (AE) is a significant threat that can cause up to 70% yield loss in wet years. Despite management strategies such as resistant varieties, seed treatments, and soil amendments, effective control of AE remains challenging due to the disease's complexity. Therefore, this study aims to explore the potential of zeolite, a natural, biodegradable aluminosilicate mineral with potential antifungal properties, as an emerging seed coating strategy for the management of AE. A greenhouse experiment was conducted to screen 67 different zeolite-based seed coatings for AE suppression. The initial screening was performed using the mycelial inoculation method, in which seeds were directly sown into vermiculite containing *Aphanomyces* mycelial plugs. Disease severity was evaluated based on honey-brown root discoloration, a characteristic symptom of AE infection. Preliminary results indicate that few zeolite seed coatings have shown promising effects, with lower disease severity compared to the control. Based on this initial assessment, 15 seed coatings were selected for further evaluation using oospore suspension for inoculation. However, the assessment is still ongoing before any conclusion can be made.

Keywords: Seed coating, *Aphanomyces* root rot, field pea, zeolite, Pea root rot complex

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Enhancing Cell Recovery during Single-Cell Protein Production: More Protein at Shorter Time.

Single-cell protein (SCP) has promising potential to substitute conventional protein sources used in animal feed, such as fishmeal and soybean meals, as its production requires less land and water. However, despite advancements in microbial cultivation technologies, downstream processing remains a significant bottleneck as it can still contribute up to 60 - 80 % of the total process cost. For example, during separation, chemical flocculation introduces additional material costs and can compromise product purity, while centrifugation suffers from poor process integration and high energy requirements. Crossflow filtration, on the other hand, offers a superior alternative to conventional separation techniques due to its higher selectivity, greater separation efficiency, and improved process integration. This study aimed to investigate strategies for enhancing the separation efficiency of *Methylophilus methylotrophus* from fermented broth using crossflow filtration. It was hypothesized that membrane surface chemistry significantly influences separation performance, enabling the achievement of the desired cell concentration within a shorter processing time. To test this hypothesis, comparative experiments were conducted using polyether sulfone membranes (negatively charged, 0.2 μm pore diameter) and polyvinylidene fluoride membranes (neutral surface charge, 0.2 μm pore diameter) under identical operating conditions. As a result, the rate of flux decline caused by concentration polarization and membrane fouling was reduced by $46.9 \pm 0.3\%$ for the negatively charged polyether sulfone membrane. Compared to previous studies, which concentrated the same bacteria from 18.8 ± 0.2 g/L to 53.3 ± 0.2 g/L over 5 hours, the current strategy achieved a concentration of 138 ± 3 g/L from an initial 16.2 ± 0.5 g/L within the same timeframe. This confirms the effectiveness of surface chemistry to enhance cell recovery during single-cell protein production.

Keywords: Single cell protein; Downstream processing; Bioprocessing; Crossflow filtration; Microfiltration

Kiran Khurshida

AFNS PH.D

Processing with High-Intensity Ultrasound and Supercritical CO₂ for Cellulose-based Hydrogels and Aerogels

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Cellulose nanofibers (CNF) are biopolymers widely used to form hydrogels for food packaging, encapsulation, and fat substitution. The incorporation of crosslinkers can enhance hydrogel stability and mechanical performance; however, the mechanisms governing hydrogel component interactions under high-intensity ultrasound (HIUS) processing and their influence on aerogel functionality remain insufficiently understood. This study aimed to form cellulose-based hydrogels using HIUS to understand properties like rheology. Then, supercritical CO₂ (SC-CO₂) drying was used to form aerogels to understand absorption properties. Hydrogels were processed by HIUS (600-1200 W, 20 min). Rheological behavior was analysed using oscillatory shear measurements. Selected hydrogels were solvent-exchanged with ethanol and dried using SC-CO₂ (40 °C, 100 bar) to form aerogels. Water holding and oil absorption capacities were measured to assess absorption performance. All CNF hydrogels exhibited storage modulus (G') values exceeding loss modulus (G'') across the angular frequency range of 1-100 rad/s, confirming the formation of stable and elastic gel networks. Aerogels crosslinked displayed significantly higher water holding and oil absorption capacities than without any crosslinker but excessive crosslinking reduced absorbency. This study demonstrated that the crosslinking behavior of CNF is strongly governed by the molecular structure and concentration of crosslinker under HIUS processing. Oscillatory rheology confirmed the formation of elastic and stable CNF hydrogel networks. SC-CO₂ drying preserved the hydrogel network, yielding highly porous aerogels. Lower crosslinker concentrations promoted open structures with enhanced water holding and oil absorption capacities, whereas excessive crosslinking resulted in denser networks with reduced absorbency. Overall, these findings clarify that the HIUS processed hydrogels and SC-CO₂ dried aerogels had tailored mechanical and functional properties for food and biomaterial applications.

Keywords: Cellulose nanofibers; High-intensity ultrasound; Crosslinking; Hydrogels and aerogels; Supercritical CO₂ drying.

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Floors, Ceilings, and Gaps: How Does Parental Leave Design Shape Maternal Employment?

Since their introduction in 1971, maternity and parental leave policies have been recognized as a critical family policy for supporting mothers in the labour force, yet mothers' employment still lags behind that of women without children and men. This qualitative study drew on focus groups (n = 19) and individual interviews (n = 39) with 58 mothers of preschool-aged children in Alberta, Canada, in 2019–2020. Using qualitative description, this study finds that current policy design entrenches gendered and socioeconomic disparities in access to and use of parental leave benefits. Overall, we use mothers' experiences to evaluate how Canada's family policies can better support sustained maternal employment, pointing to practical adjustments, particularly higher replacement rates, strengthened non-transferable partner weeks, and eligibility pathways that fit non-standard employment.

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Equitable Inclusion of HBCC in ECEC systems? A Comparative Review of Home- Based Child Care Across Six Countries

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"Families across international contexts rely on home-based child care (HBCC), yet HBCC settings are often unrecognized as part of public early childhood education and care (ECEC) systems. This paper offers a comparative review of how HBCC settings are included and supported within public ECEC systems across six countries: England, Germany, the United States (U.S.), Japan, Canada, and Greece. Research questions include: (1) To what extent do public ECEC systems across international contexts equitably include and support HBCC? (2) What are the government policies and provisions in place to support an equitable and inclusive mixed delivery ECEC system that recognizes the HBCC sector?

Each researcher collected data from policy documents and scientific literature relating to HBCC in their respective countries, prioritizing the most recently available information. We created a conceptual framework to guide data collection and analysis, enabling us to develop a comparative mapping of the characteristics of ECEC systems that integrate HBCC as a legitimate and supportive element of quality. To ensure validity and reliability, each researcher examined documents from their home country in collaboration with international peers. Our comparative analysis examined four areas of interest: 1) funding and compensation; 2) regulatory systems and rules; 3) standards and qualifications for HBCC; and 4) support infrastructure for the HBCC sector.

We found that HBCC recognition and regulation vary widely. England and Japan integrate HBCC into ECEC with structured policies, while the U.S. and Canada exhibit fragmented regulations. Germany enforces strict qualification requirements, whereas Greece offers minimal formal recognition. Key challenges include inconsistent funding, regulatory gaps, and a lack of quality frameworks tailored to HBCC. Based on these findings, we recommend increased public investment, quality frameworks recognizing the specific characteristics of HBC, and tailored support for HBC providers. The results of this research can help guide policy creation to strengthen public systems to support HBCC, benefitting children, families, and communities.

Key words: Home-based childcare, early childhood education, diversity, inclusion, childcare policy

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A critical analysis of The Parent and Grandparent Sponsorship Program reforms

On 7th March 2025, Immigration, Refugees and Citizenship Canada (IRCC) announced that it planned to accept up to 10,000 complete sponsorship applications under the Parents and Grandparents (PGP) program from the existing application pool, while disallowing new submissions. The announcement illustrates Canada's shift from a period of rapid growth to a more restricted approach to immigration. The IRCC frames the PGP sponsorship program as a math problem: too many applicants. The halt of new submissions puts many immigrant families at a disadvantage, as grandparents are perceived as necessary "stabilizers" for immigrant families as they transition to a new life in Canada (Bragg & Wong, 2015). Restrictive immigration policies often result in a "care gap," forcing parents to manage work and child-rearing without traditional, intergenerational support, leading to increased stress and potential isolation. These changes in the PGP program will worsen the economic and social disparities faced by racialized and immigrant Canadians. Although research has shown that parents and grandparents in immigrant families engage in activities that contribute to the economy and their families, this has had no reflection on immigration policymaking in Canada. This research seeks to answer the question: What is the 'problem' of a large backlog represented in the PGP sponsorship program, and what are the underlying implications and the effects of this representation on immigrant families? Drawing on Carroll Bacchi's 'What's the problem represented to be?' (2012), I examine Family Reunification policies, focusing heavily on the Parents and Grandparents Program, using migration scholarship, policy documents, and public discourse. This research extends our understanding of immigration by exploring how state interventions shape immigrant families under prevailing financial and political pressures, and how that has led to the high politicization of the family immigration class. Research can be used by policymakers and activists hoping to make policy reforms.

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Emergent landscapes: gardens and bicycles in cities; embodied engagement of mind/body/environment through art/craft making supported by interdisciplinary research with material culture studies.

Why does art/craft making matter? Why are researchers in interdisciplinary fields like anthropology, archaeology and history, through material culture studies, actively participating in making processes alongside skilled artists and craftspeople to better understand mind, body, environment engagement and our human relationship with the material world? Humans engage creatively with the material world as a way of exploring, transforming, extending and connecting with their environment. As a visual artist pursuing my MA in Human Ecology - Material Culture studies, I am interested in the deep human history of making practices and how development of skilled craftsmanship impacts our human experience. This hands-on fieldwork by researchers that validates the complexity of making, supports my own research as an artist creating a series of Urban Bicycle/Garden paintings and exploring how my practice extends into the environment through memory and engagement with the material world. My paintings represent spatial interior and exterior relationships within the dense confines of cities that are working to enfold green space, community urban gardens, safe cohesive cycling infrastructure and public transit into the dense population of cities. In the act of painting, the transformation of materials into lived places and travelled environments, involves a personal remembering and observing of unexpected entanglements among buildings and wild spaces, kitchens and gardens, sitting-rooms and forests, where vibrant cities with the familiar vernacular of neighbourhood architecture and public space are travelled on multiple planes. The complex interconnectivity among humans, things and the natural world are rendered intuitively through washes, drip marks, and brush strokes. This presentation provides examples from material culture studies research to support how art/craft making creatively engages humans in an embodied relationship with the world around them. Pathways extend beyond art making to afford renewed connections to cities, bring spaces alive and create balance and possibility.

Key words: Painting practice; Material engagement, Urban Gardens, Entanglement, Memory

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Patterns and determinants of ecological integrity in a temperate forest region

As the impact of climate change and anthropogenic disturbance continues to intensify around the world, the ecological integrity (EI) of forest ecosystems is compromised in various ways. This study aims to quantify ecological integrity, explore its latitudinal patterns, and identify the potential determinants behind it. We selected 15 indicators of forest composition, structure, and function and used two approaches to quantify ecological integrity. The results show a significant negative correlation between forest ecological integrity and increasing latitude. Climate emerged as the main driver of the latitudinal pattern compared to anthropogenic and other influencing factors. Our study offers a new approach to quantifying ecological integrity based on a set of indicators that may help assess the contribution of forest ecosystems in conservation, restoration, and ecosystem services.

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Soil Carbon Dynamics: Comparing Organic Carbon Composition in Podzolic and Luvisolic Subsoils from Canadian Forests

Studying organic carbon in subsoil layers is essential for understanding soil carbon storage, stabilization, and overall carbon dynamics. Subsoil layers store approximately 30–60% of total soil carbon, yet they remain an understudied component of the carbon pool in Canadian forest soils. Podzols and Luvisols, two of Canada's main forest soil types, exhibit contrasting subsoil processes: podzolization and lessivage. In podzolization, the subsoil becomes enriched with metal oxides such as iron and aluminum. These metal oxides interact with organic matter to form organo-metallic complexes, which are important for stabilizing soil organic matter. Conversely, lessivage, the downward movement of clay particles from surface horizons and their accumulation in the subsoil, is a key soil-forming process in Luvisols. The translocated clay and organic matter form organo-clay complexes, which help stabilize organic carbon through mineral association.

We analyzed subsoils (B horizons) from Podzols located in New Brunswick, Quebec, and British Columbia, as well as Luvisols in British Columbia, Alberta, and Quebec. Samples were characterized using double-shot pyrolysis gas chromatography–mass spectrometry with tetramethylammonium hydroxide as a derivatizing agent. Preliminary results indicate clear compositional separation between Podzolic and Luvisolic B horizons, consistent with preferential adsorption aligned with distinct soil processes and stabilization environments. Podzolic subsoils exhibited proportionally greater aromatic and phenolic compounds, while Luvisolic subsoils showed relatively greater contributions from nitrogen-containing compounds. Podzolic samples were also rich in plant-derived compounds, whereas microbial-origin compounds were present in greater concentrations in Luvisolic samples. These findings support the hypothesis that soil organic carbon composition differs between the B horizons of Podzols and Luvisols, reflecting differences in soil properties, carbon inputs, and dominant stabilization pathways. Further, results corroborate the concept that soil mineralogical characteristics strongly influence subsoil organic carbon composition in Canadian forests.

Keywords: Deep Carbon, Podzolization, Lessivage, Analytical Pyrolysis, Soil Organic Carbon Composition.

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ReNR PH.D. 3rd

A Co-granulated Urea and Sulphur Fertilizer Reduces Soil N₂O Emissions while Increasing Crop Yields

Sulphur (S) and nitrogen (N) fertilizer input increased in Canada and across the world, especially in canola-wheat cropping systems across Western Canada, the nation's central region for crop production. However, sulphate-S is susceptible to leaching, and urea can elevate nitrous oxide (N₂O) emissions, a potent greenhouse gas (GHG). Combining urea and S via the micronized elemental S technology (MST), the co-granulated fertilizer products (e.g., UreaMST) were developed to improve season-long N-S availability, their use efficiencies, and reduce N₂O emissions. It remains unclear whether urease inhibitors (UIs), weakening urease activity and potentially reducing N₂O emissions, can impact N₂O emissions when coated with UreaMST. In addition, concerns are rising about the differential influence of fertilizer placements on crop yields and N₂O emissions for these fertilizers. A three-year field experiment was established in central Alberta, Canada, arranged in a randomized complete block design (RCBD) with four blocks and eight treatments (T1: no-N control, T2: no-S control, T3: side-band urea, T4: broadcast urea, T5: side-band UreaMST, T6: broadcast UreaMST, T7: broadcast urea + UI, T8: broadcast UreaMST + UI). Treatment effects on crop yields and growing-season cumulative N₂O emissions were analyzed using linear mixed-effects models with year, treatment, and their interaction as fixed effects, and block and plot as random effects. Factorial effects were tested by two-way mixed-model ANOVA within the complete treatment subset: for no-UI treatments T3–T6, fertilizer (urea vs UreaMST) × placement (side-band vs broadcast); and for broadcast treatments T4/T6/T7/T8, fertilizer × UI (with or without). Controls (T1 and T2) were compared with N-S balanced fertilized treatments T3–T8 using Dunnett-adjusted contrasts ($\alpha = 0.05$). The result showed that crop yields varied strongly by year and showed significant treatment effects, with a significant year × treatment interaction: All N-containing treatments (T3–T8) significantly increased wheat yield (2025) relative to T1, and T3 and T8 significantly increased canola yield (2023) relative to T2. Within the no-UI subset (T3–T6), fertilizer effects were year-dependent (Year × fertilizer significant), while placement effects were not consistently significant across years. In the broadcast subset (T4/T6/T7/T8), UI treatments increased crop yields. The treatment and year × treatment effects on growing-season cumulative N₂O emissions were significant and dominated by year effects with fertilizer and placement effects not consistent across years. In the broadcast subset, UI effects on N₂O were detected ($p = 0.03$). Overall, UreaMST + UI showed 2.1% (canola) and 11.0% (wheat) higher yield than urea under broadcast, while the mean cumulative N₂O emissions was 36.6% lower, indicating that the UreaMST + UI formulation is potentially a promising fertilizer strategy that mitigates N₂O emissions and benefits crop yields in Alberta croplands despite varying impacts by year.

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Greenhouse Gas Mitigation and Soil Microbial Responses to a Nitrapyrin-Based Nitrification Inhibitor in Western Canadian Barley Cropping Systems

"Nitrification inhibitors (NIs) are widely used to mitigate soil greenhouse gas (GHG) emissions associated with nitrogen fertilizer application while maintaining crop productivity and soil health. Barley is a major crop in western Canada; however, the effectiveness of NIs in reducing soil GHG emissions and their potential impacts on soil microbial communities in barley-based systems remains insufficiently evaluated. In this study, we assessed the effects of eNtrench, a nitrapyrin-based NI, on soil GHG emissions and bacterial community at the St. Albert Research Station, University of Alberta (Edmonton, Canada), under feed (AB Cattlelac) and malting (ACC Synergy) barley varieties. Experimental treatments included: no nitrogen fertilizer, 100% of the recommended urea rate, a 70% reduced urea rate, and the corresponding urea rates combined with eNtrench. Measurements were conducted over two consecutive growing seasons in 2024 and 2025. Across both years, the application of eNtrench significantly reduced soil nitrous oxide (N₂O) emissions by an average 31%. In 2025, eNtrench also resulted in a significant reduction of soil carbon dioxide (CO₂) emissions (approximately 19%) in plots planted with the ACC Synergy. In contrast, soil methane (CH₄) uptake was not significantly affected by eNtrench application. Moreover, based on one-year microbial sequencing data collected in 2024, the application of eNtrench exerted only minor effects on the soil bacterial community. Overall, our results indicate that the use of nitrification inhibitors represents a promising management strategy for mitigating soil N₂O emissions associated with conventional nitrogen fertilization in barley cropping systems of western Canada, offering environmental benefits.

Keywords: Barley, Nitrapyrin, Soil GHG emissions, Fertilizer management, soil bacterial community

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ReNR PH.D. 4th

Regional distributions of Plant Sexual Systems in temperate forests and the differential effects of Climate Change

Background/Objectives: Variation in plant sexual systems is an important component of biodiversity. However, how the plants of different sexual systems are distributed in landscapes and how habitat conditions, particularly climates, affect the distribution is not well understood.

Methods: In this study, we investigated the biogeographic distribution of species richness, biomass and productivity of three sexual systems (monoecy, dioecy and hermaphroditism) for 69 tree species in 20 families in the temperate forest of Northeast China and quantified the relative contributions of different environmental factors to these patterns. We also projected the effect of climate change on the distribution of the three sexual systems in 2100.

Results: The results showed that the majority of monoecies were originated from temperate zones and had the highest biomass, productivity and distribution in the region. This dominance of monoecies was due to that they were temperate-originated and niche-conserved. The species richness and productivity of hermaphrodites had a similar set of influencing factors as the other two sexual systems. The proportions of species richness, biomass and productivity of monoecious species were predicted to decrease by up to 43.4%, 29.0%, 25.4%, respectively, under future climate change, while the proportions of the other two sexual systems increased.

Conclusions/Significance: Our study supports the biogeographical conservatism hypothesis under the scenario of no change of climate but predicted that temperate-originated monoecies would yield to other sexual systems under future climate change scenarios. This study contributes to understanding the regional distribution of different sexual systems in temperate forests and shows the necessity of considering geographical origins of plant sexual systems in assessing impacts of climate change on the diversity of forest flora.

Keywords: Climate change; geographic distribution; machine learning modeling; temperate forest; sexual systems

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CSR Strategies and the Factors Influence Plant Communities Along the Rural–Suburban–Urban Gradient

Understanding the mechanisms maintaining urban plant diversity is necessary for improving urban ecosystem resilience and sustainability. Grime's Competitor–Stress-tolerator–Ruderal (CSR) theory provides a framework for explaining variations in plant strategies along the urban-suburban-rural gradient. However, how CSR strategies shift across urbanization gradients and what are the key influencing factors is little studied. In this study, we quantified the CSR strategies of plants along rural-urban transects and calculated community-weighted mean (CWM) scores for each site. Multinomial logistic regression was applied to model the influencing factors on the CSR strategies at both the species and community levels. Our results showed significant shifts in CSR strategies from rural to urban. The S-strategy plants were dominant in urban habitats, followed by C plants, with R plants being least common. Along the rural-urban gradient, C plants were significantly increased, while S plants were significantly increased. No significant change was observed for the R plants. Soil nutrients, leaf chlorophyll content, management frequency, and green space area were found to influence the shift of CSR strategies, indicating soil conditions, plant traits and management play crucial roles in shaping urban plant communities. Our rural-urban CSR-strategy analysis can provide theory-based support for sustainable management of urban diversity and communities.

Keywords: Community assembly; Grime's CSR strategy; Plant functional traits; Urbanization gradient; Urban plant diversity"

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Liming effects on microbial communities in Black and Grey soils of the Canadian Prairies

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Abstract

Soil acidification is one of the constraints to crop production globally. About 6.3 million acres of land in Western Canada are acidic (pH 6.0 or lower), with more than 90% of these acidic soils occurring in Alberta. Soil acidity can be ameliorated through liming. Soil acidity and liming may impact microbial communities. However, research on liming effects on soil microbial communities in the prairies for current, diverse, intensive crop rotations is still limited. This project aimed to assess the effects of different liming materials on microbial communities in different soil zones. and Small-plot experiments at two sites: The Breton Plots (Gray Luvisol) and Crop Diversification Centre-North (Black Chernozem), with five treatments (i.e., agricultural lime, cement kiln dust, hydrated lime, sugar beet lime and control) and a wheat-canola-oats rotation were conducted. Soil samples were collected 0-7.5 and 7.5-15 cm depths. Bacterial and fungal communities were assessed using DNA sequencing. Liming had no effects on microbial communities. No significant differences were observed in the relative abundance and alpha diversity of both bacterial and fungal communities among treatments. Non-metric dimensional ordinations did not show any distinct clustering patterns between samples with different lime treatments. However, bacterial community composition varied with site and depth while fungal community composition varied with site. Our results demonstrated that liming effects in no-till systems may take longer to be observed, and perhaps smaller sampling depth increments may help capture microbial communities' response to liming.

Keywords: soil acidity, liming, microbial communities, soil health

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REES Masters 2nd

Cultural Diversity and Greenhouse Gas Emissions: Evidence from Canada

"This paper examines the causal relationship between cultural diversity and greenhouse gas emissions across Canadian provinces. While studies recognize cultural diversity as a prominent driver of economic growth and innovation, its environmental implications remain underexplored. Using province-level panel data for Canada from 1991 to 2021, this study analyzes how different dimensions of cultural diversity, such as ethnic origin, mother tongue, and immigration-based diversity, affect changes in GHG emissions.

To address the endogeneity and reverse causality issues, this research employs a panel local projections (LP) framework with instrumental variables. A shiftshare variable, using non-permanent resident admission of a fixed year, is constructed to use as an instrument. Empirical specifications include province fixed effects and focuses on different emissions to capture dynamic responses over time. Three cultural diversity indices are constructed from Canadian census microdata while emissions and macroeconomic controls are drawn from datatables from Statistic Canada.

Preliminary results indicate heterogeneous effects of cultural diversity on emissions. Overall, diversity is associated with scale effects that increase emissions, but also offsetting technological effects that reduce emissions. This research finds that ethnic-origin and immigration-based diversity tend to lower emissions, consistent with enhanced technological and knowledge fusion and efficiency gains. In contrast, mother-tongue diversity is initially associated with higher emissions; however, this effect reverses once controlled for GDP per capita, non-permanent resident shares, and change in goods-producing employment. Including these controls amplifies the emission-reducing effects of ethnic and immigration-based diversity while highlighting the role of economic structure in mediating language-related diversity effects.

These findings are directly relevant to climate and environmental policy in immigration-intensive economies such as Canada. The results suggest that the environmental impacts of diversity depend on its composition and interaction with economic conditions. This study contributes to the literature on diversity and environmental outcomes and offers policy-relevant insights for the design of coordinated immigration, environmental, and provincial policies aimed at sustainable growth.

Keywords: Cultural diversity; Greenhouse gas emissions; Immigration; Environmental impacts; Panel local projections; Instrumental variables"

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Backyard Drivers of Urban Forest Dynamics: Tree Planting and Removal Motivations in a Small Alberta City

Well managed urban forests provide important benefits to cities and residents, such as decreasing heat island effects and pollution, increasing property values, and providing aesthetic experiences. Trees are found throughout cities, however trees on private property are an essential but often overlooked component of urban forests. City residents impact urban forest canopy through diverse and context dependent motivations for tree planting and removal. Understanding residents' motivations to plant and remove trees can inform strategies that encourage planting, mitigate removal, and help managers anticipate future urban forest legacies. Therefore we surveyed 548 residents of a small Alberta, Canada city; collecting open-text responses on tree planting and removal motivations, demographic and property characteristics, and environmental attitudes. Motivations were binary coded and analyzed using hierarchical clustering. Cluster membership was tested against demographic and property characteristics, and environmental attitudes. Results showed that residents were primarily motivated to plant trees for fruit, aesthetics, and privacy; and motivated to remove because of poor tree health, risk to property or people, or too much maintenance. Respondents were clustered based on motivations as "fruit lovers", "landscape planters", "tree replacers", and "tree lovers". We found tree lovers lived in their current home longer than fruit lovers. Based on removal motivations, respondents were clustered as "pragmatic removers" and "tree health removers". Those earning below \$49,999 were more likely to be pragmatic removers. Pragmatic removers had older homes and less trees on their property than tree health removers. This research underscores a persistent discrepancy between residents' and city managers' urban forest priorities. Situating our results within socio-ecological systems theory we show that expanding the urban forest canopy on private property would benefit from engagement by a wider range of institutions beyond the municipality.

Keywords: Urban forest; Private trees; Motivations; Public engagement; Socio-ecological system

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Protein Hydrolysis of Chicken Feet using Pressurized Hot Water and Pressurized CO₂ Media Assisted by Enzymes

"The valorization of poultry by-products like chicken feet is a sustainable strategy for recovering hydrolysates. Conventionally, hydrolysis uses acids or bases. This study compares emerging pressurized hot water hydrolysis (PHW) with enzyme-assisted pressurized CO₂ media (EPC) for the hydrolysis of chicken feet proteins. The hydrolysis was performed using PHW at 50 bar, 40-180°C for 10-60 min compared to EPC at 60-300 bar, 37-50°C for 6-24 h with 2% enzyme to substrate (E/S). The hydrolysates were evaluated for the degree of hydrolysis and amino acid composition. The chicken feet showed the proximate composition of 55.7±0.2% protein, 3.2± 0.5% fat and 41.1±0.3% ash on a dry basis. Results indicated that the degree of hydrolysis was not significantly different by EPC (10.8%) using pepsin (2% E/S, pH 3, 37°C, 24 h, CO₂/300 bar) compared to the PHW hydrolysis (11.6%) at 50 bar, 180°C for 60 min. The EPC hydrolysates exhibited significantly higher total amino acid content (143.8±4.2 mg/g chicken feet) compared to the PHW hydrolysates (8.1±1.0 mg/g chicken feet), particularly higher content of glycine, phenylalanine, aspartic acid and leucine. Results showed that the hydrolysates using pepsin at CO₂/300 bar/24h improved enzymatic accessibility and cleavage efficiency compared to the PHW. These effects are attributed to protein swelling, and partial unfolding, that facilitate enzyme penetration and cleavage of proteins. Overall, enzyme-assisted pressurized CO₂ media demonstrated superior hydrolysis efficiency and amino acids quality compared to the PHW, highlighting its potential as a green and effective processing technology for the upcycling of chicken feet proteins.

Keywords: Amino acids, chicken feet, enzyme, green technology, hydrolysates.

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From Methanol to Lipids: A Bioprocess Approach Using *Methylorubrum extorquens* OSD20 and *Auxenochlorella protothecoides* UTEX 256

Microbial lipids are a promising renewable source for liquid fuels, but large-scale viability is limited by feedstock cost, process stability, and conversion efficiency. Methanol is an attractive carbon source because it is inexpensive, easily accessible, and compatible with controlled feeding in bioreactors; however, methanol toxicity and narrow tolerance windows often inhibit growth and lipid productivity in microorganisms. This project will develop a bioprocess focused on a Methanol to Lipids strategy using the methylotrophic bacterium *Methylorubrum extorquens* OSD20 and, in parallel, the oleaginous microalga *Auxenochlorella* (*Chlorella*) *protothecoides* UTEX 256. For *M. extorquens* OSD20, methanol inhibition thresholds will be identified across practical concentration ranges, and cultivation variables (pH, temperature, and micronutrients) will be identified to maximize lipid production. Promising operating conditions will be transferred into lab-scale bioreactors operated in batch and fed-batch modes to evaluate stability, reproducibility, and scale-up feasibility under controlled conditions. In parallel, *A. protothecoides* UTEX 256 will be subjected to adaptive laboratory evolution under controlled methanol exposure to expand the tolerance window while maintaining lipid productivity, followed by adjustment of cultivation conditions to maximize lipid accumulation and improve overall process robustness. Lipid extracts and profiles will be quantified using gas and liquid chromatography to support comparisons across conditions and microorganisms. The outcomes will provide an integrated dataset connecting methanol handling strategies with microbial performance and lipid outputs, supporting evidence-based decisions on whether methanol influenced lipid bioprocessing can be a viable pathway to produce renewable drop-in fuel.

Keywords: Methanol, Biofuel, Oleaginous, Methylotrophic, Lipids, Methanol Tolerance, Microalgae, Bacteria

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Comparative Genomic Analysis and Virulence-Associated Variation from Single-Spore Isolates of *Plasmodiophora brassicae*

Canola is one of the most economically important crops worldwide, yet remains threatened by a biotrophic protist known as *Plasmodiophora brassicae*, the causal agent associated with clubroot disease of canola. The obligate parasitic nature of *P. brassicae* has created logistical complexities with obtaining enough DNA to do whole genome sequencing and subsequent bioinformatic analysis. These issues have been recently addressed with the use of susceptible hosts for multiplication and an optimized high-molecular weight DNA extraction protocol. One of the most utilized management strategies for clubroot has been the utilization of clubroot resistant (CR) canola cultivars. However, the deployment of first and second generation of CR canola cultivars have applied a strong selection pressure on *P. brassicae* pathotypes, leading to the emergence of resistance-breaking pathotypes and an increase in the abundance of rare virulent pathotypes. Utilizing whole genome sequencing on these rare virulent pathotypes represents an opportunity to better understand the genomic basis of virulence of *P. brassicae* on canola. Comprehensive assemblies enable the detection and analysis of key evolutionary processes, including meiotic and mitotic recombination, structural variants, rearrangements, and large sequence variations, all of which are potential mechanisms contributing to pathogen diversification. Determining the genomic basis of virulence can also aid in the creation of rapid-pathotyping assays for the rapid detection of rare virulent pathotypes in agricultural soils. This study will use microlaser technology to isolate single spores of resistance breaking pathotypes 9D and 9E to obtain high-quality genomic sequences utilizing a hybrid approach with ONT ultra-long and Hi-Fi PacBio long-read sequencing. Obtaining these sequences will be informative on the genomic basis of virulence and aid in the development of rapid pathotyping assays for pathotypes 9D and 9E.

Keywords: canola; clubroot; genomics; plant pathology; whole genome sequencing

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Control of *Listeria* in Mixed-species Biofilms

Biofilm formation in food processing environments facilitates the persistence of *Listeria monocytogenes*, increasing the risk of contamination and foodborne illness outbreaks. Although *L. monocytogenes* is known to establish in mixed-species biofilms, the influence of microbial interactions on its persistence remains poorly understood. This study aimed to determine how bacterial community composition affects *L. monocytogenes* persistence within multi-species biofilms. Experiments were conducted using 32 non-redundant combinations derived from a five-member bacterial community isolated from a food processing facility. Multi-species biofilms were formed on stainless steel coupons, and biofilm biomass was quantified using crystal violet staining. *L. monocytogenes* cell counts were determined relative to coupon surface area using colony morphology differentiation. Pellicle and aggregate formation were visually assessed, and DNA pellets were collected for downstream analysis. Statistical analyses were performed to evaluate differences in *L. monocytogenes* growth across community combinations. *Carnobacterium maltaromaticum* significantly inhibited *L. monocytogenes* growth, likely through the production of bacteriocins or competitive interactions. In contrast, *Serratia liquefaciens* only reduced *L. monocytogenes* counts in the absence of *C. maltaromaticum*, suggesting limited inhibitory capacity when faced with dominant competitors. Pellicle and aggregate formations occurred only in combinations containing either *Pseudomonas shahriarae* or *Janthinobacterium tructae*. However, results from this study, along with previous findings, suggest *J. tructae* is the primary species responsible for producing structurally robust pellicles. In the complete 15-member community experiment, pellicle formation was absent in the most complex community, which contained a high number of *Pseudomonas* species, further supporting *J. tructae*'s role in pellicle development. These findings highlight the importance of microbial community composition in influencing *L. monocytogenes* persistence. Monitoring indicator species such as *C. maltaromaticum* or *S. liquefaciens* in food processing facilities can help predict and prevent *L. monocytogenes* establishment.

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Non-Target Effects of Insecticides on Alfalfa Weevil Predators

Alfalfa (*Medicago sativa* L.) is a key global forage crop. Still, its productivity is threatened by the alfalfa weevil (*Hypera postica* Gyllenhal), a major defoliator that can cause significant damage and yield reduction, particularly in seed production systems. In Canada, *H. postica* management has traditionally relied on insecticides, which led to insecticide resistance and unintended negative impacts on non-target beneficial arthropods, including natural enemies of the weevil. Given these challenges, there is a growing need to improve our understanding of predator communities and their potential contributions to biological control in alfalfa seed production. This study aims to document predator diversity, abundance, and activity in commercial alfalfa seed fields in southern Alberta and to assess how insecticide applications shape these communities, to create more sustainable integrated pest management (IPM) strategies. During the 2025 growing season, field surveys were conducted across multiple alfalfa fields with different groups of insecticides being sprayed. Sweep net sampling was used to quantify foliage-active predators and track their dynamics relative to *H. postica* densities in both insecticide-treated and untreated plots. Preliminary results indicate a diverse predator community dominated by coccinellids, nabids, and anthocorids. Early analyses indicate that insecticide applications reduce *H. postica* densities but also significantly suppress predator populations. This reduction may weaken natural biological control, particularly during key weevil developmental stages. Although final analysis is still underway, these findings suggest the potential trade-offs associated with insecticide use in alfalfa production. A clearer understanding of predator community composition, abundance, and activity will enhance IPM strategies that balance effective *H. postica* management with the conservation of beneficial arthropods. This work contributes to broader efforts to reduce dependence on insecticides and promote ecological sustainability in Prairie alfalfa seed production systems.

Keywords: Prairie agroecosystems; Non-target effects; Predator-prey interactions; Sustainable agriculture; Natural enemy conservation

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Cover Crop Species Richness and Harvest Frequency Effects on Forage Responses in the Black Soil Zone of Alberta

A two-year field experiment (2024–2025) was conducted in the Black Soil Zone of central Alberta to evaluate the effects of cover crop species richness and harvest timing on forage production, nutritive value, and botanical composition. The study utilized a split-plot randomized complete block design with four replicates, assigning harvest timing as the whole plot (July and September, vs September only), while subplots consisted of ten cover crop mixtures varying in species richness (1–10 species) and 5 different functional groups. Mixtures included cereals, legumes, brassicas, pasture herbs, and floral herbs. Measurements included forage accumulation, canopy height, light interception, nutritive value [crude protein (CP) and neutral detergent fiber (NDF)], and botanical composition. Averaged across years, forage accumulation declined with increasing species richness ($P = 0.024$). Mixtures containing 1–3 species consistently produced greater biomass than highly diverse mixtures (≥ 8 species). Forage accumulation was significantly affected by treatments, species richness, functional group composition, harvest timing, and year ($P < 0.05$), with significant treatment \times harvest timing interactions. Cereal-based mixtures produced the greatest forage accumulation ($\approx 9,800$ kg DM ha⁻¹). Nutritive value was primarily influenced by year and harvest timing ($P < 0.01$). Crude protein differed among functional groups ($P = 0.014$), with mixtures containing cereals, legumes, and brassicas exhibiting the highest concentrations ($\approx 11.7\%$), while NDF varied among functional groups ($P = 0.042$). Botanical composition varied significantly with harvest timing and year, with PerMANOVA indicating that these factors explained approximately 25% of compositional variation. Weed suppression was lowest under September-only and July–September regrowth harvests. Cereals consistently dominated harvested biomass and were associated with the lowest weed proportions, indicating strong competitive suppression. Overall, moderate cover crop diversity (1–3 species or 2–3 functional groups) optimized forage accumulation, maintained favorable nutritive value, and enhanced weed suppression, whereas highly diverse mixtures reduced productivity.

Keywords: polycrops, polycultures, cocktail crops, forage mass, ecological functioning.

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Distribution of Alfalfa Weevil Deltamethrin Resistance on the Canadian Prairies

The alfalfa weevil, *Hypera postica* (Coleoptera: Curculionidae), is an important pest of alfalfa, *Medicago sativa* (Fabaceae). In alfalfa forage crops, manipulating harvest timing is often sufficient for management. However, this strategy is not compatible with alfalfa seed production where management relies heavily on insecticides. This reliance on insecticides is thought to be a contributing factor to the development of insecticide resistance. Alfalfa weevil populations with resistance to pyrethroids have been documented in southern Alberta and the western United States, but the distribution of resistance across the Canadian Prairies is unknown. The objective of this study was to compare deltamethrin susceptibility across the Prairie Provinces. Alfalfa weevils were collected from alfalfa seed production fields across Alberta, Saskatchewan, and Manitoba. Standardized laboratory bioassays were conducted to determine susceptibility to the active ingredient deltamethrin. Alfalfa weevil populations in Alberta and Saskatchewan showed resistance, but resistance was not detected in populations from Manitoba. Knowledge of the distribution of deltamethrin resistance allows for informed pest management decisions by producers. "This form does not allow for italics, but if this abstract is posted anywhere could the names ""*Hypera postica*"" and ""*Medicago sativa*"" please be italicised in the abstract and keywords?

Keywords: Insecticide resistance; Pyrethroid; Deltamethrin; *Hypera postica*; *Medicago sativa*.

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Extraction of phytochemicals from oat straw by conventional method

Oat straw, from *Avena sativa*, is a low-cost agricultural waste product rich in bioactive phytochemicals such as phenolic compounds and flavonoids which are beneficial to human health. This study aims to optimize the extraction process using conventional ethanol solid-liquid extraction, to achieve maximum antioxidant activity and total phenolic content (TPC). Proximate analysis was performed on the oat straw, followed by extraction at varying ethanol concentrations and pH levels. Antioxidant activity was assessed using the DPPH assay, TPC was measured with the Folin-Ciocalteu method. Results showed the highest antioxidant activity at 20% ethanol at pH 3 and highest TPC at 20% ethanol, pH 10. The optimized extraction conditions were identified as 20% ethanol at pH 7. These findings support the oat straw as a sustainable source of bioactive compounds for use in the food, health, and cosmetic industry.

Keywords: Oat straw; conventional extraction; phytochemicals; phenolic compounds; waste valorization

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Sensitivity Screening of *Pyrenophora tritici-repentis* to Propiconazole and Pyraclostrobin fungicides and significance genetic resistance genes in durum wheat

Tan spot, caused by the necrotrophic fungus *Pyrenophora tritici-repentis* (Ptr) is a destructive foliar disease of wheat. The pathogen can reduce yield up to 50% in extreme cases and symptoms of infection are tan-oval spots surrounded by chlorotic halos. Overuse of chemical treatments can lead to resistance in the Ptr population. This research aims to quantify whether or not modern Ptr isolates have developed resistance since the last published study of this topic in 2013, and to find sources of genetic resistance within Mediterranean durum wheat. Pyraclostrobin and propiconazole are common ingredients for pathogen management. Four concentrations of each active ingredient will be used for the trials (pyraclostrobin: 0.05, 0.1, 0.2 and 0.4 µg/mL; propiconazole: 0.001, 0.01, 0.1 and 1.0 µg/mL), along with an agar control. Agar plugs (10 mm diameter) will be taken from Ptr isolates to be tested and transferred onto plates containing different concentrations of pyraclostrobin and propiconazole. Durum wheat will be inoculated with Ptr races 2, 3, and 5 containing Tox A, C and B respectively. After five days, second leaves will be rated on a disease scale of 1-5. GWAS analysis will be conducted using the GAPIT package in R. SNP markers found to be associated with tan spot resistance will be used to search the GenBank Ensembl genome browser with the BLASTN tool. Marker sequences will be realigned (BLASTN) to the *Triticum turgidum* (Svevo. v1 RefSeq Rel. 1.0) reference sequence. Results show an increase in EC50 for Ptr isolates in comparison to 2013. This suggests an increase in chemical resistance within the last decade. Genetic screening of Mediterranean durum wheat suggests potential SNP markers that are linked to resistant genes. These genotypes can later be incorporated into breeding programs.

Keywords: wheat genomics; sustainable management; food security; breeding lines; fungicide sensitivity.

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UAV modeling of forage mass, depletion, and recovery across grazing systems in Alberta rangelands

Grazing effects are assessed using point-based field plot sampling, which limits direct inference to landscape scales. This sampling strategy ignores the complex behavioral impacts associated with the disturbance of grazing across pastures, animal movement, habitat selection, and patch defoliation, which varies both spatially and temporally. This research will integrate GNSS collar data on cattle locations (including conventional GPS and virtual fencing) with repeated UAV sample surveys using LiDAR and multispectral sensors to quantify (i) forage mass patterns across the rangeland landscape, (ii) how grazing systems shape cattle spatial occupancy of the landscape, and (iii) evaluate how animal occupancy translates into spatially explicit patterns of forage removal and recovery. This research is being conducted within replicated pastures of the CAT-G (Climate Action Through Grazing) experiment at two contrasting University of Alberta locations: Kinsella (Aspen Parkland; seeded/tame pasture; hummocky terrain) and Mattheis (Mixed grass Prairie; native rangeland; stabilized dune complexes), capturing wide gradients in vegetation composition, soil, topography, and grazing processes. The study included two different forms of grazing management that are expected to change animal foraging behaviours and patterns of vegetation use: adaptive multi-paddock (AMP) in which animals rotate through many small pastures, and continuous in which animals have access to a single large pasture. The study is planned around two objectives: (1) quantify cattle occupancy, patchiness of use, and landscape/habitat selection under continuous versus adaptive multi-paddock (AMP) grazing; and (2) quantify and map forage structure/biomass using fused UAV-based LiDAR and multispectral data, evaluate the spatial grain at which grazing effects are detectable, and integrate GNSS exposure layers to explain forage depletion and recovery. Outputs include high-resolution grazing-exposure surfaces and forage-depletion maps that enable mechanistic interpretation of existing vegetation and soil datasets and greenhouse-gas measurements (eddy-covariance towers). Collectively, these products will deliver transferable analytical workflows and extension-ready decision-support tools for stakeholders.

Keywords: remote sensing, adaptive multi-paddock grazing, cattle, GNSS collar, LiDAR, MSS.

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Evaluating the Susceptibility of *Medicago lupulina* to Members of the Pulse Root Rot Complex

The Pulse Root Rot Complex (PRRC) is a group of pathogens detrimentally affecting yields for pea (*Pisum sativum*), lentil (*Vicia lens*), and dry bean (*Phaseolus vulgaris*) growers. Of particular concern, are the causal agents of *Aphanomyces* root rot (*Aphanomyces euteiches*) and *Fusarium* root rot (*Fusarium* sp.). Evaluation of an emerging weed, *Medicago lupulina*, as an alternative host for a complex of pathogens will further inform integrated pest management practices. Similar research has been performed on the closely related model organism *M. truncatula*, and varying levels of susceptibility to *A. euteiches* were discovered between biotypes. In 2025, 50 *M. lupulina* root samples were collected from southwestern Saskatchewan, with 200 more sample collections to follow in 2026. DNA will be extracted from these samples and evaluated via multiplex PCR, with positive tests resulting in subsequent qPCR testing to quantify the level of infection and estimate inoculum production. Multiplex reactions are currently being optimized with evaluation of root samples to immediately follow. The increasing presence of a potential host in a key pulse growing region necessitates evaluation of the ability to act as an alternative host for the PRRC.

Keywords: Integrated pest management; Plant pathology; Weed science; Pulse crop management; Molecular biology

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Assessment Of "Green" Protein Extraction Techniques On Porcine Spleen Isolates As Valorization Option For Meat By-Products

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Porcine spleen is a protein-rich meat by-product often underutilized in North America due to perceived processing challenges and consumer perception. To understand consumer perception on acceptability of meat by-products, a preliminary survey indicated that several respondents reluctant to consuming by products would consider them if transformed into functional ingredients. This propels the technical evaluation of suitable recovery methods. This study evaluated the recovery of porcine spleen protein isolates (PSI) using "green" extraction methods; ultrasound-assisted extraction (UAE), and enzyme-assisted extraction (EAE), compared to conventional pH-shift, to valorize meat by-product. In general, extraction methodology significantly affect protein recovery (PR) ($P \leq 0.05$). EAE using Alcalase had a better PR (78.17 ± 0.24 %), compared to the pH Shift method (56.04 ± 0.13 %). For functionality assessment, both green methods enhanced the foamability and stability with UAE been the highest (8.76 ± 0.27 ml/g; 7.36 ± 0.30 %), and pH shift was significantly ($P \leq 0.05$) lower than the two (3.57 ± 0.28 ml/g; 2.95 ± 0.26 %). Green extraction methods further show significant improvement in PSI functionality; they both had improved emulsifying activity index (EAI) (47.81 ± 0.67 m²/g) and emulsifying stability index (ESI) (28.48 ± 0.55 %) against 19.67 ± 0.51 for pH shift, a good indication for suitable application in emulsions, but exhibited low water holding capacity (WHC), especially EAE with ~zero WHC. In contrast, the ultrasound cavitation of UAE enhanced oil holding capacity (OHC), reflecting higher OHC (2.45 ± 0.21 g/g) against 1.73 ± 0.00 g/g for the pH shift. Solubility is a key technofunctional property that plays significant role in protein isolate utilization in food formulation, and the green extraction methods enhanced the PSI solubility. Additionally, the PSI from EAE showed good antioxidant capacity (ABTS⁺ % inhibition; 81-85%, DPPH radical scavenging activity; 56.42%), a functionality that reflects antioxidant-rich food ingredient. Overall, this study shows that the green extraction methods (UAE and EAE) do not only improved the PSI protein recovery, they also produced PSI with better technofunctional enhancement capacity.

Keywords: Green extraction; Meat by-products; Porcine spleen; Protein recovery; Valorization.

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Arbuscular Mycorrhizal Fungi Enhance Wheat Performance in Canola-Wheat Rotations: A Cultivar-Dependent Response in Alberta

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Arbuscular mycorrhizal fungi (AMF) enhance nutrient uptake, soil health, and agricultural productivity. In Alberta, wheat is frequently rotated with canola. However, canola is a non-mycorrhizal crop, which can interrupt AMF continuity in soil. This disruption potentially diminishes AMF populations and effectiveness, limiting symbiotic benefits for subsequent wheat crops. However, the response of Canadian Western Red Spring (CWRS) wheat cultivars to AMF following canola remains poorly understood in Alberta. This study hypothesizes that CWRS cultivars vary in their AMF interactions and performance in canola-wheat rotations under field conditions. We examined how six CWRS cultivars (AAC Brandon, AAC Viewfield, AAC Hockley, AAC Hodge, CDC Utmost and Go early) responded to furrow-applied AMF inoculation under canola-wheat rotation at two locations in Alberta (St. Albert and Westlock) across two growing seasons. At the flowering stage, root, shoot, and bulk soil samples were collected and analyzed for AMF root colonization, plant biomass, plant nutrient levels, and soil nutrient availability. Furthermore, grain yield and seed protein were assessed at seed maturity. AAC Viewfield emerged as the most AMF-responsive cultivar at both sites, exhibiting enhanced root colonization, elevated soil available phosphorus (P) and nitrogen (N), increased shoot nutrient concentrations (N, P, zinc-Zn), greater biomass, and superior grain yield relative to uninoculated controls. Root colonization rates were considerably higher at Westlock compared to St. Albert (~67% and 46% in 2024; 46% and 18% in 2025, respectively). AMF impacts on soil nutrient availability varied by location, with increased available N and P detected exclusively at St. Albert. Grain yields improved with AMF inoculation across all cultivars and sites, particularly at St. Albert, without compromising seed protein concentration. These findings confirm that AMF can substantially improve wheat performance in Prairie canola-wheat rotations and suggest that strategic cultivar selection may maximize these symbiotic benefits under Western Canadian growing conditions.

Keywords: AMF, wheat-canola rotation, cultivar responsiveness, sustainable agriculture, nutrient acquisition"

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What drives greater fertility in dairy cattle with short anogenital distance?

In female cattle, anogenital distance (AGD) extends from the anus to the clitoris. Dairy cattle with short AGD are more fertile than those with long AGD, and AGD is moderately heritable; thus, AGD is a promising indicator trait for fertility. To investigate the mechanisms driving the established inverse relationship between AGD and fertility, we compared progesterone hormone profiles in the second estrous cycle of post-pubertal Holstein heifers (age, 273 ± 8 d) of short (n = 12; 91.8 ± 1.1 mm) and long AGD (n = 11; 103.2 ± 1.2 mm), categorized using median AGD (97.7 mm) as the cut-point. Blood samples were collected twice weekly throughout the cycle and progesterone in plasma was quantified (Biovet Ovucheck® ELISA kit). Data were analyzed in R using Welch t-tests and linear mixed-effects models with heifer ID as a random effect. Peak progesterone (10.4 ± 1.4 vs. 6.1 ± 0.6 ng/mL), average progesterone (4.8 ± 0.4 vs. 3.3 ± 0.3 ng/mL), and area under the curve (26.9 ± 2.9 vs. 18.8 ± 2.4 ng/mL) were greater (P < 0.05) in short- than in long-AGD heifers. In conclusion, shorter AGD was associated with higher progesterone levels in dairy heifers, indicating stronger luteal function. Results indicate that AGD reflects differences in ovarian progesterone production and may help explain previously reported links between shorter AGD and improved fertility. As a simple, non-invasive measure, AGD has potential to be a complementary tool in heifer evaluation to identify variation in reproductive potential, and with further validation, support more informed breeding decisions. Take-home message: Anogenital distance is a simple body measurement that could help producers identify heifers with better reproductive potential, before they attain breeding age.

Keywords: Anogenital distance, fertility traits, reproductive efficiency, dairy heifer fertility

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Testing a Novel Kefir for Improved Blood Glucose and Microbiome in a Prediabetic and Diabetic population.

Fermented foods are becoming increasingly associated with improved health outcomes; however, further research is needed to understand their therapeutic potential across diverse populations, health endpoints, fermentation methods, and impact on the microbiome. Kefir is a traditionally fermented milk beverage produced from kefir grains containing a complex consortia of bacteria and yeasts. Recent pilot-scale work in our laboratory demonstrated that consumption of kefir produced by a specific microbial consortium isolated from traditional kefir improves immune and cardiovascular markers in mildly hypercholesterolemic males compared to commercial kefir. Building on these findings, this study will examine the effect of consuming traditional kefir on the same outcomes but further explore impact on glycemic control, metabolic markers, gut microbiota composition and its function, and immune health in individuals at risk of developing, or with type 2 diabetes. A 12-week randomized controlled trial (n=156) will be conducted using a 2x2 factorial design, where overweight or obese male and female adults (24-70 years old) at risk of, or with type 2 diabetes, will consume either kefir or unfermented milk. The kefir will be produced under controlled fermentation conditions by a consortium comprising 5 bacteria and 4 yeast. Blood and stool samples will be collected at week 0, 6, and 12. Anthropometric, metabolic, and immune markers will be assessed, alongside gut microbiome composition using metagenomic sequencing. The previous pilot study showed a reduction in cardiovascular risk markers among participants. We expect to observe similar results in this study. This larger study explicitly investigates gut microbiome and blood glucose regulation—areas prior research didn't prioritize. This study addresses key gaps in fermented food research by integrating controlled microbial fermentation with comprehensive clinical outcomes for a large cohort, advancing evidence-based understanding of how fermentation-derived microbes contribute to cardiometabolic, immune, and gut health benefits.

Keywords: Fermented foods; Gut microbiome; Cardiometabolic health; Defined microbial consortium; Randomized control trial

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Effects of Plasma-Activated Nanobubble Water and Ultrasound on Reactive Species and Biofilm Inactivation

Biofilms on food-contact and water system surfaces are highly resistant to common sanitisers, thereby creating long-standing food safety and sanitation problems. Recently, new green technologies such as plasma-activated water, which is rich in reactive oxygen and nitrogen species (RONS), have been explored for non-thermal microbial inactivation. This study aimed to determine whether plasma-activated nanobubble water (PANBW) alone or in combination with ultrasound-induced cavitation could improve RONS diffusion and microbial inactivation. A lab-scale PANBW system (60 kHz, 160 V, 20 min, 2 slpm airflow; 8 L) and ultrasound processor (20 kHz, 60% power, 10 min; 1 L) were designed and built. RONS (H_2O_2 , O_3 , NO_2^- , NO_3^-) were quantified using photometric detection kits. Physicochemical parameters such as oxidation-reduction potential (ORP), electrical conductivity (EC), pH, dissolved oxygen (DO), and temperature were also determined. *Pseudomonas* spp. biofilms were prepared on 2.5 × 2.5 cm stainless steel coupons after 6 days of biofilm growth and were treated in batch mode (10 min; 70 mL/min; 700 mL). Viable cells were enumerated using plate count methods, and statistical significance was set at $p < 0.05$. PANBW caused a substantial increase in ORP, DO, and RONS concentrations ($p < 0.05$), with a rise in EC and a slight decrease in pH. Ultrasound-enhanced acoustic cavitation and smaller bubble size enhance transient radical bursts. PANBW alone resulted in $>1 \log CFU/cm^2$ biofilm reduction compared to distilled water ($p < 0.05$). However, PANBW combined with ultrasound did not show any additional significant inactivation. PANBW proved to be effective in the enhancement of reactive species production and exhibited significant biofilm reduction, thus showing promise as a sustainable approach to sanitation. While ultrasound increased physicochemical properties, it did not contribute to further inactivation of microorganisms. Further optimisation of treatment conditions and RONS stability is required for practical applications.

Keywords: Plasma-activated nanobubble water; Reactive oxygen and nitrogen species; Biofilm inactivation; Ultrasound cavitation; Food safety and sanitation.

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Compost-Based Biostimulants for Sustainable Nutrient Management in Wheat-Canola Rotations

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Compost-based biostimulants (CBB) are increasingly recognized as sustainable tools for improving crop productivity while enhancing soil health and ecological balance. Partial substitution of synthetic fertilizers, especially nitrogen, with these CBB can minimize the risk of greenhouse gas emissions and nutrient leaching. H-start, a compost-based biostimulant enriched with beneficial bacteria and fungi, is designed to maintain microbial viability through minimal processing and to enhance soil functionality.

This study evaluated the effects of H-start combined with nitrogen-phosphorus-potassium (NPK) fertilizers applied at 75% and 100% of recommended rates on crop yield, seed quality, and soil nutrient availability, including available NPK, in a wheat-canola rotation. Four treatments, including 100% NPK, 100% NPK with H-start, 75% NPK, and 75% NPK with H-start, were assessed from 2023 to 2025 at two contrasting agroecological sites in Alberta: Forestburg (dark brown soil) and Westlock (dark gray soil). Across both sites and crops, H-start improved overall crop performance, with responses more consistent in wheat than in canola. In wheat, 75% NPK with H-start consistently increased soil NPK availability at Forestburg, while yield and grain protein were comparable to 100% NPK treatment at both sites. In canola, this treatment consistently increased soil K availability at Forestburg, with yields comparable to the 100% NPK fertilizer rate at both Westlock and Forestburg. Notably, under water-limited conditions in 2024, H-start treatments showed enhanced nutrient availability and yield stability, particularly at Forestburg, which had low organic matter (4.3%) and an acidic pH (5.3). The soil NPK under 75% NPK with H-start was significantly higher in both wheat and canola, while wheat yield and oil content in canola were also significantly higher.

These findings indicate that H-start is beneficial under compounded stress conditions and support the use of CBB in enhancing nutrient cycling and reducing reliance on synthetic fertilizers without compromising crop productivity.

Keywords: compost-based biostimulants; soil nutrient availability; sustainable fertilizer management; crop rotation

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Effect of Plant Growth Regulator and Seeding Rate Interaction on Barley Root and Shoot Parameters

Barley lodging is a significant agronomic constraint in barley production, resulting in substantial reductions in grain yield and malting quality. Canadian barley growers widely apply plant growth regulators (PGRs) to inhibit stem elongation and reduce the risk of lodging. However, because seeding rate affects plant competition and root growth, the combined effects of PGR and seeding rates on barley root traits remain poorly understood. This study examined PGR application in AAC Synergy, AB Cattlelac, and Kasota barley varieties when seeded at 1, 2, and 4 plants/pot, with eight replications per treatment. Agronomic parameters measured at BBCH 49 included plant height, shoot dry weight, and root dry weight. Root traits, including total (TRL) and specific (SRL) root length, surface area (RSA), volume (RV), and mean root diameter (MRD), were measured from scanned root images. Compared to the control (no PGR), PGR application reduced plant height and both shoot and root dry weight across all seeding rates, while tiller number decreased only at the lowest plant density. Application of PGR also increased TRL, RSA, and RV, but decreased MRD. SRL was the highest in 1 plant/pot, and other shoot and root traits declined with increasing seeding rates across varieties. The results indicate that, in addition to inhibiting elongation, PGR alters the root growth, demonstrating that its effects are not restricted to aboveground traits. At higher seeding rates, the reduced root response highlights the importance of optimizing seeding rate to increase the effectiveness of PGR application.

Keywords: Barley; Combined effect; PGR; Root traits; Seeding rate

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Enhancement of the microbial biofilm inactivation efficacy of plasma-activated nanobubble water by UV-C and hydrogen peroxide

Cold plasma and nanobubbles are recognized for their effectiveness in microbial inactivation and wastewater treatment. This study combines gaseous air plasma species and nanobubbles to generate plasma-activated nanobubble water (PANBW) along with UV-C and H₂O₂ (340 ppm) treatment in an 8 L batch reactor for 30 minutes. The PANBW was then integrated with a plasma bubble system to enhance the reactive nitrogen and oxygen species through continuous treatment. Later, the solution was flowed over biofilms of *Pseudomonas* food spoilage microorganisms on 25×25mm food-grade stainless steel (SS304) coupons. Bacterial enumeration using standard plate counts revealed a >5 log CFU/cm² reduction in biofilm microbial counts for the novel AOP (advanced oxidation process), when nanobubbles were combined with plasma, UV-C, and H₂O₂, demonstrating effective antibiofilm potential. The combination treatment showed strong performance, indicating a sustainable surface sanitization method. Nanobubble characterization indicated a decrease in bubble size (134±4 nm) during plasma exposure and an increase in zeta potential (-42.23±1.49 mV), indicating highly stable PANBW formation. Additional estimates of RONS, oxidation-reduction potential, and electrical conductivity for the combined treatments indicated higher values, confirming enhanced antimicrobial potential. Unlike current chemical sanitization methods, which generate hazardous waste with complex processing, plasma nanobubbles provide a residue-free, water-based, sustainable sanitization process that remains economically feasible.

Keywords: Cold plasma, Food surface sanitization, Biofilms, Nanobubbles, AOP

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Sod-Seeding Perennial Legumes for Pasture Rejuvenation

Within the cow-calf production system, pasture forage composition can alter ruminant diets. Overgrazing may lead to degraded pastures and dominance by less productive species. Legumes such as alfalfa (*Medicago sativa* L.), sainfoin (*Onobrychis viciifolia* Scop.), and cicer milkvetch (CMV, *Astragalus cicer* L.) usually have greater protein and digestibility than grasses; thus, increasing their prevalence will improve livestock diets on pasture. Additionally, legumes can fix atmospheric nitrogen through associations with rhizobia bacteria, decreasing the need for off-farm nitrogen inputs. Incorporating legumes via sod-seeding is a potential low-cost alternative to wholesale pasture plowing and re-seeding. This project was conducted in central Alberta, Canada, to determine the impact of directly planting legumes into pasture without using herbicides to remove existing vegetation. A sainfoin-alfalfa-CMV mix was sod-seeded in early April, using a minimum till seeder as the soil was undergoing freeze-thaw cycles, with plots established in a randomized complete block design with five replicates. Treatments were sod-seeded or non-seeded (control) strips 100 m long by 7 m wide. Within each strip, four sampling plots were installed along a transect, every 25 m. In each plot, permanent quadrats (1 x 1 m) were used to track seedling emergence over time. Seedling emergence data were analyzed in R using a generalized linear mixed model assuming a negative binomial distribution. Significantly more alfalfa seedlings were observed in the sod-seeded vs the control plots ($P < 0.05$). After adjusting for seeding rate, there was a significantly higher emergence rate in sainfoin during the first evaluation time ($P < 0.05$). There were also significant differences in within species emergence between some evaluation times ($P < 0.05$). CMV failed to reach sufficient germination to compare statistically with the other species. This project will help ranchers determine whether sod-seeding legumes could be a cost-effective alternative for pasture rejuvenation with legumes.

Keywords: alfalfa; cicer milkvetch; sainfoin; frost-seeding; seedling emergence

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Impact of Humic-Based Soil Amendments on Nitrogen Fixation and Growth of Dry Beans (*Phaseolus vulgaris* L.)

Dry bean is the third most cultivated pulse crop in Canada, wherein Alberta contributes 17% of the nation's production. Although dry beans can fix atmospheric nitrogen with the support of symbiotic nitrogen fixing bacteria living in root nodules, they are generally less efficient than other legumes, typically fixing under 50 lb per acre. Therefore, finding a strategy to improve symbiotic nitrogen fixation (SNF) is a high priority. Humalite, a naturally occurring substance rich in humic acid and sourced from Southern Alberta deposits, has proven to enhance nodulation and nitrogen fixation in some grain legumes. However, its effects on dry beans remain largely unexplored. This study investigates the impact of Humalite on root nodulation, plant growth, and SNF in dry beans. A pot experiment will be conducted under greenhouse conditions, using four different rates of granular Humalite (0, 400, 800 and 1600 kg ha⁻¹). Dry bean seeds of AAC Whitehorse variety will be inoculated with *Rhizobium tropici* USDA 9030 and planted in pots containing different rates of Humalites. A non-nodulating mutant (R99) will be grown as a non-nitrogen-fixing control. After six weeks of growth, data will be collected on root length, root surface area, root volume, nodule number, nodule dry weight, and shoot and root biomass. The capacity for symbiotic nitrogen fixation will be assessed using the 15N isotope dilution method. The research findings will reveal the potential of Humalite in improving SNF in dry beans and plant growth.

Keywords: Nitrogen; Symbiotic Nitrogen Fixation; *Rhizobium*; Humalite

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From Waste to Treasure: Cement Kiln Dust Combined with Digestate and Humic Acid for Soil Improvement and GHG Mitigation

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The generation of industrial waste poses critical challenges to environmental sustainability, necessitating innovative strategies for repurposing such waste materials. Cement kiln dust (CKD), a by-product of the cement industry, and digestate (DG) and humic acid (HA), derived from organic waste through anaerobic digestion and decomposition have demonstrated potential in improving soil health and sustainability. However, the impact of the combined application of CKD and DG and HA remain poorly understood. A four-year field experiment was conducted in Alberta, Canada, to evaluate the effects of CKD and DG and HA applications on soil properties, GHG emissions, and crop yield under wheat – canola rotation. The experiment consisted of five treatments: CK (control), CKD, CKD-HA, CKD-DG, and CKD-half fertilizer (HF). In the third year, a re-application treatment (CKDr) was added by splitting all CKD plots to double the application rate, bringing the total to nine treatments. In the fourth year, a half-fertilizer (CK-HF) was introduced by splitting the control (CK) plot, resulting in a total of ten treatments. Results showed that all CKD treatments significantly increased soil pH compared to CK increasing from 5.58 to 6.31. CKDr-DG significantly enhanced available phosphorus by 54.16%, from 10.71 mg/kg to 16.50 mg/kg. CKDr-HF significantly increased microbial biomass nitrogen by 108.56%, from 15.50 mg/kg to 21.22 mg/kg, and microbial biomass carbon by 80.89%, from 426.80 mg/kg to 772.05 mg/kg. Regarding GHG emissions, CKD-HA reduced CO₂ emissions by 16.10%, CKDr-DG reduced cumulative N₂O emissions by 60%, and all treatments acted as CH₄ sinks. CKD-HF significantly increased wheat plant height by 7.4% and yield by 8.9% compared to CK. Our results demonstrate that the combined application of CKD with digestate and HA can significantly improve soil pH and phosphorus availability, microbial biomass C and N, mitigate GHG emissions, and enhance wheat crop yield, offering a potential sustainable pathway for agricultural soil management.

Keywords: Cement kiln dust; Digestate; Humic acid; Greenhouse gas emissions; Soil quality

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Sequential Pretreatment Strategies for Enhancing Protein Solubilization from Brewer's Spent Grain (BSG)

Brewer's spent grain (BSG) is an abundant byproduct of the brewing industry and a promising source of sustainable plant-based protein. However, the proteins in BSG are structurally embedded within a lignocellulosic matrix, which limits their extractability using conventional alkaline extraction methods. This study evaluated sequential pretreatment strategies to enhance protein solubilization from BSG prior to alkaline extraction. Mild hot water (60°C) or room-temperature water (30°C) extraction, with or without carbohydrase pretreatment (Viscozyme), was applied before alkaline extraction at pH 9 and compared with alkaline extraction (1 M NaOH) alone or alkaline extraction followed by chemical modification using glutaminase.

Mild hot water pretreatment prior to alkaline extraction increased protein recovery in the soluble fraction from 39.9% to 46.6%. Incorporation of Viscozyme after mild hot water pretreatment further increased soluble protein recovery to 54.4% and reduced protein remaining in the residual solid fraction from 57.5% to 33.4%, indicating enhanced liberation of matrix-bound proteins. Room-temperature water extraction combined with Viscozyme pretreatment enabled effective alkaline extraction under reduced chemical and thermal severity (0.1 M NaOH, 30 °C), achieving soluble protein recoveries of 24.7–28.2%. In contrast, glutaminase treatment following alkaline extraction did not improve protein solubilization.

Overall, sequential water and carbohydrase pretreatments substantially improved protein release from BSG and promoted redistribution of proteins into soluble fractions prior to alkaline extraction. These findings demonstrate the potential of sequential pretreatment strategies to support the sustainable upcycling of brewery byproducts into value-added protein ingredients.

Keywords: Brewer's spent grain, Byproduct valorization, Enzyme-assisted extraction, Plant-based protein, Lignocellulosic matrix

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Ultrasound Processing to Improve Germination of Soybean Seeds

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In 2025, soybean production in Canada decreased by 10.2% due to lower yields, highlighting the importance of strategies that promote faster germination and seedling development. Recent research by our groups indicates that ultrasound (US) can enhance seed germination percentage and rate. This study evaluated the effect of ultrasound on the germination rate, vigor, and seedling growth of *Glycine max*. Soybean seeds were treated using an ultrasound bath (40 kHz, 110 W) at 25 °C for 30, 60, 90 and 120 min in glass and plastic beakers. A dry control group (no soaking or ultrasound) and a water-soaked control group (30 - 120 min) were included. After treatment, seeds were incubated at 23 °C for 96 h. Fresh mass was measured at 60 h, and the dry mass was determined after drying at 40 °C for 3 days. Germination was evaluated using germination percentage (G%), mean germination time (TMG) and germination speed index (IVG). The highest G% was observed in the US + GLASS group at 60 min (98%) followed by 30 min (96%). The greatest IVG was recorded in US + GLASS group at 60 and 90 min (0.48), indicating faster germination. The shortest TMG occurred in US + PLASTIC at 120 min (39.11 h) followed by US + GLASS at 90 min (41.58 h), demonstrating accelerated germination dynamics compared to the control group (64.94 h). The US + GLASS group at 30 min showed the highest sprout length and fresh mass with 23.32% and 52.74% increase compared to the control group, respectively. Among all ultrasound treatments, the highest dry mass was obtained with US + GLASS at 30 min (1.92 g). Overall, ultrasound treatment, particularly in glass containers for 30 - 60 min, improved germination vigor and seedling development in soybean seeds, demonstrating its potential as a sustainable technology.

Keywords: Acoustic; Germination; Seedling; Soybean; Ultrasound

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CRISPR/Cas9-immortalized bovine fibroblasts for cultivated fat production

Cultivated meat is emerging as a potential solution to the growing global demand for meat products, tackling multiple socioeconomic concerns associated with traditional animal agriculture such as greenhouse gas emissions, water consumption, foodborne pathogens, and animal welfare. One of the challenges in cultivated meat production is creating a product which closely mimics conventional meat and is safe and desirable for consumers. Although an abundance of research exists on characterization, immortalization, and development of muscle cell lines, these cell lines alone cannot mimic traditional meat products as they lack important components like intramuscular fat, collagen, and extracellular matrix which contribute to flavour, texture, and structure. While all of these must be considered in the development of final food products, intramuscular fat is particularly important from a consumer science standpoint. Recently, scientists have shown that embryonic chicken fibroblasts can transdifferentiate into both muscle cells and fat cells which allows for tunable control of intramuscular fat content, creating a highly palatable and realistic product. This project aims to develop an immortalized adult bovine fibroblast line which maintains trans-differentiation capacity for use in cultivated meat applications. The cells will be genetically modified using CRISPR/Cas9 technology to produce a p53 knockout cell line. We hypothesize that the machinery involved in the CRISPR/Cas9 knockout (guide RNA and enzyme) should not be detectable after several passages, yielding cells that are genetically and phenotypically indistinguishable from primary fibroblasts, excluding the targeted modification. These cells should not be tumorigenic and maintain transdifferentiation capacity making them very useful for cellular agriculture research and product development.

Keywords: cultivated meat; cellular agriculture; fibroblast; CRISPR/Cas9; trans-differentiation

POSTER TOPICS AND ABSTRACTS

HECOL

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Resistance of Joule Heating Textiles to Fatigue Bending

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Joule heating textiles are increasingly integrated into wearable products. Despite their expanding market, the lack of standard test methods to assess the quality of these products is an obstacle to further growth. This study focuses on a test protocol to evaluate resistance to fatigue bending, as repeated bending during normal use can progressively degrade the heating performance of Joule heating textiles. The study used a test bench previously designed to evaluate the durability of Joule heating textiles under repeated fatigue bending. The test apparatus consists of a fixed and a rotating board, with the specimen clamped across their junction. It uses a bending frequency of 1 Hz and a bending angle of 150° representative of joint motion during normal human walking. Five commercially relevant Joule heating textile structures were examined: woven fabric, silver plated knitted fabric, nonwoven fabric, stitched carbon filaments, and inserted wire. The heating performance of the Joule heating textiles was evaluated initially and after application of a selected numbers of bending cycles using a previously developed heating efficiency test based on temperature rise during 1 hour of electrical powering. The results demonstrated strong structure-dependent differences in fatigue bending resistance. For the woven and plated knit fabrics, the heating efficiency remained relatively stable up to 20,000 bending cycles, although the plated knit exhibited an increased heating rate with cycling. The nonwoven and stitched structures showed progressive degradation of heating efficiency. The inserted structure demonstrated the lowest durability, with complete heating failure after only 2,500 cycles due to fracture of the embedded metal strip of the conductive wire. This study represents an important step toward the development of a standardizable fatigue bending test method for Joule heating textiles and highlights the strong influence of textile structure on long-term heating performance.

Keywords: Joule heating textiles, fatigue bending, heating efficiency, durability, test methods." I will only be available on Feb 5 due to the conflict with the Symposium of the Institute of Textile Science.

POSTER TOPICS AND ABSTRACTS

REES

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There's No Place Like Home (дассан газрын даавуу зөөлөн, дундуур хэвтэр дулаан хотхон): Visualizing the Factors Contributing to Mongolian Herders' Land Loss

This project addresses climate and energy justice by analyzing how energy transition mining operations disproportionately affect Indigenous and VLC lands and values. More than half of these developments are located on or near Indigenous or VLC lands, with lithium accounting for the highest proportion. These extractive practices, often justified under decarbonization policies, perpetuate green colonialism, where Indigenous and VLC lands are exploited in the name of climate action while their voices remain marginalized in decision-making processes. Mining developments in areas already exposed to climate risks contribute further to greenhouse gas emissions, land degradation, waste, and water consumption. Infrastructure and mining traffic are exacerbating permafrost thaw, disrupting wildlife and herding lifestyles, and altering key ecosystems. These impacts impede Indigenous and VLC values, livelihoods, and food systems.

This research takes place in Orkhon, Mongolia, home to thousands of herders and one of the world's largest copper mines. This research is specifically focused on what factors influence herder decisions about where, when, and what animals to herd in Orkhon province. The objectives of this study are to spatially and orally document the ways in which mining and climate change have influenced herder livelihoods and changes to their traditional herding areas. This research aims to better inform government officials, policy makers, corporations, and community leaders how herders perceive mining development and climate risks and the ways they adapt to them. Using a qualitative, community-based approach, this research integrates participatory mapping, sketch mapping, and semi-structured interviews to document traditional and current land-use changes. This research is taking a thematic analysis approach to code interview transcripts and is using ArcGIS Pro to digitize sketch maps and calculate herder land loss.

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Citizens' Preferences for Governance Design in Community Renewable Energy Projects: Evidence from a Discrete Choice Experiment in Alberta

Community Renewable Energy (CRE) projects are increasingly promoted as a way to support local energy transitions and community development, while participation remains limited in many regions. Alberta is one of the most important fossil-fuel producers in Canada, even globally. In this context, citizens' acceptance can be very diverse. Renewable energy projects can be designed to provoke energy transitions, community development, investment opportunities, etc. And the structure of CRE projects, especially the governance structure, will affect citizens' willingness to invest. This study examines how individuals evaluate alternative governance features of community renewable energy projects and identifies what shapes their preferences. The study employs a discrete choice experiment administered through an online survey on Qualtrics. Respondents are presented with four hypothetical community renewable energy projects that vary across key governance attributes, including decision-making authority, sources of capital, distribution of benefits, type of resource that is used, and minimum investment requirements. Preliminary analysis is expected to reveal systematic trade-offs between governance structures and investment conditions. In particular, preferences are anticipated to differ across governance models that emphasize expert leadership, member control, or local government involvement. Choice data are analyzed using econometric models to estimate the relative importance of each attribute and to assess preference heterogeneity across respondents. Behavioral questions about community identity, environmental awareness, investment criteria, satisfaction with local government and demographic questions will also be included in the survey to capture the interaction between these factors and participants' WTP. We hope this research will provide empirical evidence on how governance design influences public support for community renewable energy initiatives in a resource-dependent region. The findings will offer practical insights for policymakers, energy cooperatives, and project developers seeking to design governance structures that enhance citizen participation and facilitate the expansion of community-based renewable energy.

Keywords: Community renewable energy; Governance design; Discrete choice experiment; Energy cooperatives; Citizen participation"

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From Single-Use Plastics to Bioplastics: Examining the Implications of Bioplastics from the Perspective of Canadian Composting Facilities

In 2022, the Canadian Federal Government implemented a prohibition regulation on single-use plastics which resulted in the banning of various single-use items. As a result, other materials such as compostable, biodegradable, biobased, and oxo-degradable plastics – hereafter referred to as bioplastics – have been used as a popular alternative material to plastics. However, recent reports suggest that bioplastics do not decompose properly in composting facilities and are ending up in landfills. While there are numerous scientific studies showing the environmental impacts associated with bioplastics, few analyse the disjuncture between the intended use of bioplastics by policymakers and technology experts, and the actual disposal practices occurring in waste management facilities. As a result, this research will answer the following questions: How are bioplastics being discussed by policymakers, engineering and technology experts? Are bioplastics living up to the expectations of those policymakers and experts, according to the actual waste management practices in composting facilities? Approximately 60 surveys have been sent to various composting facilities throughout Canada, with the goal of attaining 35 responses. Additionally, this research will use semi-structured interviews to analyse the perspectives of approximately 6 key informants within the waste management sector (i.e. researchers, government officials, waste management specialists, bioplastic engineers, etc.). An additional 6 interviews will be conducted with managers employed at composting facilities throughout Canada. Currently, the prohibition regulation on single-use plastics is only applicable to conventional plastics; this research will contribute to the discussion regarding whether bioplastics should be included in this ban. It will help provide a deeper understanding in the role that bioplastics have in helping the Federal Government achieve their goals of reducing plastic pollution and creating a circular economy.

Keywords: Bioplastics; Technologies; Waste Management; Composting; Circular economy

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N₂O and CO₂ Production from Intact Soil Cores across a Broad Range of Soil Conditions during the Transition to Organic Crop Management

Estimating how carbon and nitrogen pools respond during the transition from conventional to organic management is critical for ensuring overall system sustainability. Organic crop production, characterized by its restricted use of synthetic inputs and focus on resources present in the agro-ecosystem, is widely considered a sustainable alternative to conventional crop production. However, one of the most challenging aspects of organic crop production in western Canada is its reliance on the practice of tillage for weed and nutrient management, which can elicit significant process responses for both carbon and nitrogen. A proposed alternative to intensive tillage is to integrate crops and livestock in order to promote improved nutrient cycling. While both are considered effective management techniques, their impact on carbon and nitrogen cycling during the organic transition period from no-till conventional practices remains poorly understood. This research aims to examine how the introduction of tillage and an integrated crop-livestock system alter edaphic conditions which govern nutrient dynamics in soil.

Intact soil cores were collected in the third growing season of a field research trial and underwent a laboratory incubation experiment which analysed carbon dioxide (CO₂) and nitrous oxide (N₂O) fluxes. Following the incubation, soil cores were analysed with a hydraulic property analyser, and available nitrogen and dissolved organic carbon were determined. In combination, these measurements provide a comprehensive understanding of nutrient pool responses to variable soil conditions created by contrasting management techniques.

Results suggest that transition driven changes to pore structure and nutrient availability, not management type, controlled greenhouse gas production from soil. Primarily, macropores were most associated with N₂O and CO₂ production, giving a strong indication that physical properties drive emissions. These findings underscore how strongly management practices shape nutrient availability during this critical transition period.

Keywords: organic agriculture; greenhouse gas processes; integrated crop-livestock ; intensive tillage; soil incubation

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More wasps nest in artificial nests placed in treed crop borders than herbaceous crop borders

Both native bees and wasps provide crop pollination services, with wasps also contributing to crop pest management. Most native bee and wasp species nest in cavities either below ground, such as abandoned rodent nests, or above ground, in deadwood for example. However, agricultural land is associated with a reduction in bee and wasp diversity in part by reducing available nesting habitat. Crop borders, which remain relatively undisturbed, are thus important nesting habitats. To promote the highest richness and abundance of native bees and wasps in cropland, optimizing their existing nesting habitats may aid in their conservation. If most native bees and wasps nest in treed crop borders, which provide limited nesting habitat in an otherwise unsuitable landscape, I hypothesized that (1) artificial nests placed in treed crop borders would have higher occupancy than those placed in herbaceous crop borders. Additionally, (2) the treed crop borders would have higher species richness by providing a variety of nesting options. For my study I used bumblebee boxes (hollow wooden boxes) and trap nests (blocks of wood with 4-8 mm drill holes and bamboo rods) as artificial nests. I placed eight bumblebee boxes on ground level and two trap nests 1 m above ground along the borders of twelve crop fields in the central Alberta Aspen Parkland in spring 2025. Half of the borders were treed and half herbaceous. Based on preliminary results, treed crop borders had more trap nest occupancy than herbaceous borders. There was no significant difference in the average number of brood cells in trap nests between crop border type. Across all sites thus far, four wasp species have emerged from their nests, including cuckoo wasps found in three nests. Bumblebee boxes had a 0% occupancy rate. Further analysis will be done once remaining wasps emerge from their trap nests.

Keywords: Shelterbelts; Native Bees; Habitat Selection; Cropland; Landscape Ecology

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Exploring Alternatives to Pre-Harvest Glyphosate in Spring Wheat

The group 9 herbicide glyphosate has frequently been used as a pre-harvest treatment in spring wheat (*Triticum aestivum* L.) to control weeds and facilitate crop desiccation. Due to growing concerns about glyphosate residues in food products and the rising number of glyphosate-resistant weed species, there has been an increased interest in alternative herbicides. A two-year field study in Alberta, Saskatchewan, and Manitoba evaluated 12 herbicides that could serve as pre-harvest alternatives to glyphosate. Herbicide applications were performed on spring wheat before harvest, when moisture content approached 30 percent, using CO₂-pressurized backpack sprayers. Herbicide effectiveness was assessed based on visual crop desiccation and weed control ratings, wheat grain moisture content, and green cover analysis from overhead imagery. Our results suggest that the group 10 herbicide glufosinate ammonium, several group 14 herbicides (saflufenacil, flumioxazin, trifludimoxazin + saflufenacil, and tiafenacil), and the group 22 herbicide diquat can provide effective wheat desiccation and weed suppression. Given the increasing evidence linking glyphosate exposure to health risks and the global threat of weeds to food security, identifying effective pre-harvest alternatives is essential.

Keywords: (Glyphosate; Pre-harvest desiccation; Herbicide resistance; Harvest aids; Spring wheat

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Forestry in Sweden and Alberta; What can we learn from each other?

This project will synthesize knowledge on current forest management methods and further explore implication of alternative regimes in Sweden. Through a comparative perspective, the same will be synthesized for Alberta to explore what could be learned from each other. Management methods will be the focus for comparative aspects. Forest policy, ownership structures, forest history and economic aspects will however also be included to explore incentives driving forest management decisions. Lastly, from an analytical perspective external drivers that could cause a shift in forest management will be investigated. Investigating alternative, multifunctional forest management regimes contribute to the knowledge of how forestry can integrate ecological and social values into goals of timber productions and economic profit. This is important to help identify concerns and incentives shaping management actions which support multiple benefits, including environmental, economic and social. Therefore, I will compare and contrast economic, operational, institutional, and cultural factors that shape forestry practices in Sweden and Alberta, and assess whether they act as barriers to multifunctional forest management. Additionally, to learn what the ecological, social and economic capability of alternative management regimes are? And lastly, by interviewing forest owners and managers, explore if the respondents perceive a need for a shift in forest management regime, and if so, what barriers prevent any desired shifts. The literature review will contain a broad search of scientific articles as well as grey literature and social science articles assessing forest management methods in Sweden and Alberta. Qualitative data collection will be included to gain insights from the forest industry on the sustainability of practiced management regimes. I will be interviewing forest owners and managers to learn what opinion managers and owners hold on forestry sustainability issues and if they perceive a need for introducing alternative management regimes. Initial findings from the literature review constitutes general reasons why new forest management approaches are not being adopted in Sweden. A general lack of knowledge and experience of alternatives methods to clearcutting constrains the Swedish industry from adapting to other methods as well as a strong sense of tradition with 'business as usual'. There is a focus on mitigating effects of climate change in Alberta, to incorporate risk management and to diversify forest management which in this initial state of the study seem to be something Swedish industry can learn from. Only a small part of the world's forests are being formally protected for biodiversity conservation. Managed forests therefore are an important contribution to habitat availability and the management regime practiced consequently influence the habitats carrying capacity. Additionally, social and cultural aspects also have a share in the forest arena. Reindeer herding is a traditional practice which have gained usufructuary rights in parts of Sweden. This has been a cause for conflict between owner and herder as intensive management practices have altered the conditions reindeers and herders are adapted to. Conclusively, the need to consider multiple benefits in forest management constitute the main motivation behind this project.

Keywords: Alternative forest management; Multifunctional forestry; Combined objective forestry; Sustainable forest management; Close-to-nature forestry

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Balancing Human and Wildlife Values: Is There a Significant Relationship between Visitorship and Changes in Wildlife Behaviour Within Canada's Parks and Protected Areas?

Parks and protected areas aim to achieve both human values, such as recreation, education, and reconciliation, as well as ecological values, such as wildlife and landscape protection. It is also important that these parks and protected areas have visitorship and tourism because it helps provide funding for them. Because of this, I want to know if visitorship within parks has a significant impact on the behaviour and livelihood of wildlife that live within and are supposed to be protected by these areas. Some previous studies have found changes in wildlife behaviour, both temporally and spatially, due to human activities within parks and protected areas. Many have found that predatory wildlife tends to avoid humans where possible, however, some animals, such as ungulates, tend to stay near people, which is consistent with the human shield hypothesis. Parks Canada has extensive data on human-wildlife interactions, as well as visitorship records, that are publicly available. Additionally, the British Columbia Conservation Officer Service also has very detailed records on human-predator interactions on a month-by-month basis. Using Excel and R, I will examine the relationships between this data. I want to especially take a look at the changes that happened during the COVID-19 pandemic, where many Parks and Protected Areas saw decreases in visitorship, as this might showcase the most dramatic changes. If we want to manage both wildlife values and human values, co-existence must be achieved, conflict needs to be minimized, and the effect on wildlife's quality of life must be improved or at least the same as in unprotected areas. This study aims to find relationships between visitation levels and conflicts so that a management recommendation could be made that could potentially reduce human-wildlife conflicts and improve the livelihood of wildlife, while still achieving desired anthropocentric values.

Keywprds: Parks and Protected Areas, Human-Wildlife co-existence, Human shield hypothesis, Temporal/Spatial behaviour, Balancing Values.

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Effects of Amendments on the Anaerobic Bioremediation of Organohalides in Contaminated Soil and Groundwater

Organohalide and petroleum hydrocarbons are commonly found in soil and groundwater at contaminated oil and gas industrial sites. Specifically, tetrachloroethylene (PCE) and its daughter compounds (trichloroethylene, dichloroethylene, and vinyl chloride) along with co-contaminants benzene and toluene pose numerous health risks to humans and wildlife. The objective of this research is to evaluate the effectiveness of biostimulant amendments in increasing the rate of dechlorination of PCE and its daughter compounds in the presence of benzene and toluene. Soil and groundwater were taken from a brownfield industrial site in Edmonton, Alberta. Microcosms were prepared with soil and groundwater from the site and then spiked with benzene, toluene, and PCE. Triplicate microcosms were left untreated or treated with biostimulants- ERDENHANCED, or lactate. The microcosms were kept in an anaerobic chamber to maintain reducing conditions, and regular GC measurements of concentrations of contaminants and other gases (methane, carbon dioxide, ethene) were done by headspace injection. qPCR for bacterial species Dehalococcoides and 16s microbial sequencing were performed to examine community shifts throughout the experiment. Microcosms amended with ERDENHANCED had increased microbial presence compared to the lactate treatment or the unamended microcosms. Amended microcosms had faster removal rates compared to unamended microcosms. This work provides insights on the role of amendments in remediation and their complex interactions within the soil microbiome, namely the selective enriching of dechlorinating microbes.

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Assessing asynchrony and temporal stability of productivity in boreal aspen–spruce mixedwoods

Stability in forest productivity, measured as periodic increment in diameter at breast height (DBH), is an increasing concern under climate change and intensifying disturbance regimes. Previous studies report higher temporal stability in productivity (TSP) in mixed-species forests compared to monocultures, largely due to interspecific asynchrony (IA) among species with complementary traits. This research tests the relationship between IA and TSP in boreal aspen–spruce mixedwoods (*Populus tremuloides* and *Picea glauca*), extending stability theory to a low-diversity managed forest system. It assesses effects of stand density and species composition at different organizational levels and provides empirical insight for mixedwood management.

Using the Mixedwood Long-Term Study (central and western Canada), we analyze repeated DBH measurements over 30 years from 21 installations. IA is quantified via mean cross-correlation and related to TSP at population and community levels. TSP in mixed stands is compared with corresponding aspen and spruce monocultures. Higher IA is expected to increase TSP at the community-level by buffering year-to-year fluctuations through internal temporal niche complementarity and differential species responses to environmental fluctuations. In contrast, the effect on TSP at the population level is expected to be lower or negative because compensatory dynamics operate at the stand level but not within individual species. The IA–TSP relationship is expected to vary along the species composition gradient, with strong positive effects in more balanced mixtures where both species contribute similarly to stand productivity. This study improves understanding of growth and stability dynamics in boreal aspen-spruce mixedwoods. It tests whether the asynchrony-stability relationship is present in low-diversity managed forest systems. The findings will inform boreal mixedwood management by clarifying whether mixtures or monocultures provide greater TSP.

Keywords: Boreal mixedwoods; Temporal stability; Asynchrony; Productivity; Forest composition

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Rethinking Wildfire Suppression in Alberta’s Ecologically Sensitive Landscapes

Recent wildfire seasons in Alberta have burned hundreds of thousands of hectares under increasingly severe weather conditions. Fires that have burned in the wildland urban interface, threatening communities or beloved national parks, receive the most attention. I want to highlight the other areas being impacted by fire, such as ecologically sensitive areas like wetlands or watersheds. Additionally, fire retardants and suppression foams used to control fire spread may negatively affect aquatic systems, soil chemistry and sensitive biota. This study evaluates whether modified suppression strategies should be considered in ecologically sensitive landscapes. It is hypothesized that wildfire suppression in wetlands and watershed areas may cause additional ecological harm, supporting the case for modified suppression approaches. I am conducting a literature review to assess documented ecological impacts of aerial retard and foam applications in sensitive ecosystems. Spatial analysis will be performed using ArcGIS to identify ecologically sensitive areas across Alberta using geospatial datasets from the Alberta Biodiversity Monitoring Institute. Historic wildfire perimeters from the past 5-10 years will be overlaid with available spatial data on aerial tanker drops to determine the extent of suppression activities occurring within wetlands and watershed areas. Drought indices will also be examined to assess how moisture conditions influence fire behaviour in wetland systems.

My findings will inform whether modified suppression strategies should be considered to reduce unintended ecological impacts and maintain effective fire management.

Keywords: Wildfire suppression, Ecologically sensitive areas, Wetlands, Watersheds, Spatial Analysis

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The Scale-Dependent Soil Spatial Asynchrony in Explaining Tree Diversity in a Subtropical Forest

Spatial heterogeneity of soil resources is thought to play an important role in maintaining tree species diversity. However, most studies examine the heterogeneity of a single or a few soil resources at specific spatial scales, not only obscuring the mechanism by which tree diversity is maintained through species partitioning along combinations of spatially co-varying soil resources but also overlooking how spatial scale influences patterns of multi-resource covariation. In this study, we introduce the concept of soil spatial asynchrony, defined as the discordant spatial covariation among multiple soil resources, as a quantitative measure of multidimensional soil resource-based habitat heterogeneity. Using a set of 15 soil resources from a 25-ha subtropical forest plot, we first quantified soil spatial asynchrony using Loreau and de Mazancourt’s synchrony metric across a gradient of resource dimensionality at both fine and coarse scales. We found that the magnitude of soil spatial asynchrony increased as soil resources were added sequentially at all spatial scales. We then modeled the effects of soil resource dimensionality on tree diversity using generalized linear models at each scale. The results showed that the relationship between soil spatial asynchrony and tree diversity was scale-dependent. At finer scales, asynchrony had neutral effects on diversity regardless of how many resources were considered, whereas at coarser scales, asynchrony involving three soil resource dimensions has the strongest positive effects on diversity. Our study shows that soil spatial asynchrony provides a novel approach for quantifying multidimensional habitat heterogeneity and can potentially be used to measure limiting resources that influence species coexistence in forest communities.

Keywords: heterogeneity-diversity relationship; soil spatial asynchrony; multidimensional habitat heterogeneity; scale-dependent; limiting resources.

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Snap the Species: Comparing vascular plant species detection in plot-based surveys by experts versus photo surveys

The surge in automated species identification tools via mobile applications has substantial potential for monitoring species and biodiversity conservation. However, it is unclear whether these apps have reached a level of performance sufficient to compete with an experienced botanist in vegetation surveys. This study compares plot-level species composition obtained from two mobile apps (Flora Incognita and iNaturalist) with concurrent morphological surveys to assess whether these apps can substitute for that of botanical expertise in routine vegetation surveys across diverse habitats and seasons. We conducted expert and photo surveys in 47 1x0.8 m plots across three sites, each from grassland and forest habitats in Alberta, Canada, in spring 2023. We extended grassland surveys over the anticipated peak bloom to test seasonality. All comparisons to expert surveys for each plot were based on species lists generated from the top-1 suggestions of both apps. We performed an ordination analysis using Non-metric Multidimensional Scaling (NMDS) to visualize species composition detected by survey methods based on Jaccard dissimilarity. We conducted a Permutational Multivariate Analysis of Variance (PERMANOVA) to test differences in species composition between the methods and to assess how these differences vary across habitats and seasons. Overall, species composition differed among survey methods in both forest ($p = 0.008$) and grassland habitats ($p = 0.001$), though dispersion also varied significantly ($p < 0.001$). In grasslands, photo surveys showed greater species compositional dissimilarity to expert surveys than compared to forest sites. Greater agreement in species composition among survey methods at grassland sites during peak bloom highlights the importance of the availability of key morphological features (e.g., reproductive structures) in reducing species misidentifications. If photo-based automated species identification captures species compositions similar to expert surveys, it could serve as a more efficient and cost-effective alternative for survey efforts.

Keywords: Automated species identification; Mobile applications; Plant surveys; Species detection; Vascular plants

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Effects of Capping Substrates and Beneficial Fungi, *Serendipita herbamans*, on Growth and Stress Physiology of Boreal Tree Species in Oil Sands Reclamation Sites

Oil sands mining has a significant negative impact on boreal forest ecosystems. It does a great deal of damage. As a result, once mining is completed, we must repair the land. This process is known as land reclamation. It promotes plant regeneration and restores the ecosystem's health. The issue is that the soil left behind by mining is unsuitable for planting. It has a lot of salt, and the pH is excessively high. The nutrients in the soil are not uniformly distributed. This makes it difficult for plants to grow and survive. We need to know more about how to improve soil conditions for plants. Oil sands extraction and the soil it produces are an issue. We need to figure out how to apply soil treatments and microbes to assist plants grow in this poor soil. This will make it easier for plants to survive and grow in the oil sand mining sites.

The main goal of this study is to investigate how various types of capping materials and the use of the helpful fungal endophyte *Serendipita herbamans* influence the growth and how these tree species handle stress, especially when they are being used to restore areas affected by oil sands mining. Field studies will take place on reclaimed areas that have been built up and covered with different materials, then topped with a mixture of peat and mineral soil. We will track certain boreal tree species to evaluate how the treatment influences the growth and settling in of plants. Growth will be checked by measuring how tall the plants are and how thick their stems are. At the same time, how well the plants are functioning will be looked at through things like how much they can perform photosynthesis, how their chlorophyll is working, their water levels, how much electrolyte leaks out, and the amount of nutrients they have. Fungal treatments will be applied to find out if *S. herbamans* help plants better withstand stress caused by tailings.

This study aims to find better capping materials that help trees grow more successfully and to examine if adding beneficial fungi might make plants stronger when facing harsh conditions during land recovery. This study will help us come up with ways, based on science, to make plants grow better and to support the long-term recovery of boreal areas that have been affected by oil sands activity. The study focuses on trees and plants, and how to make them grow better in boreal areas impacted by oil sands activity.

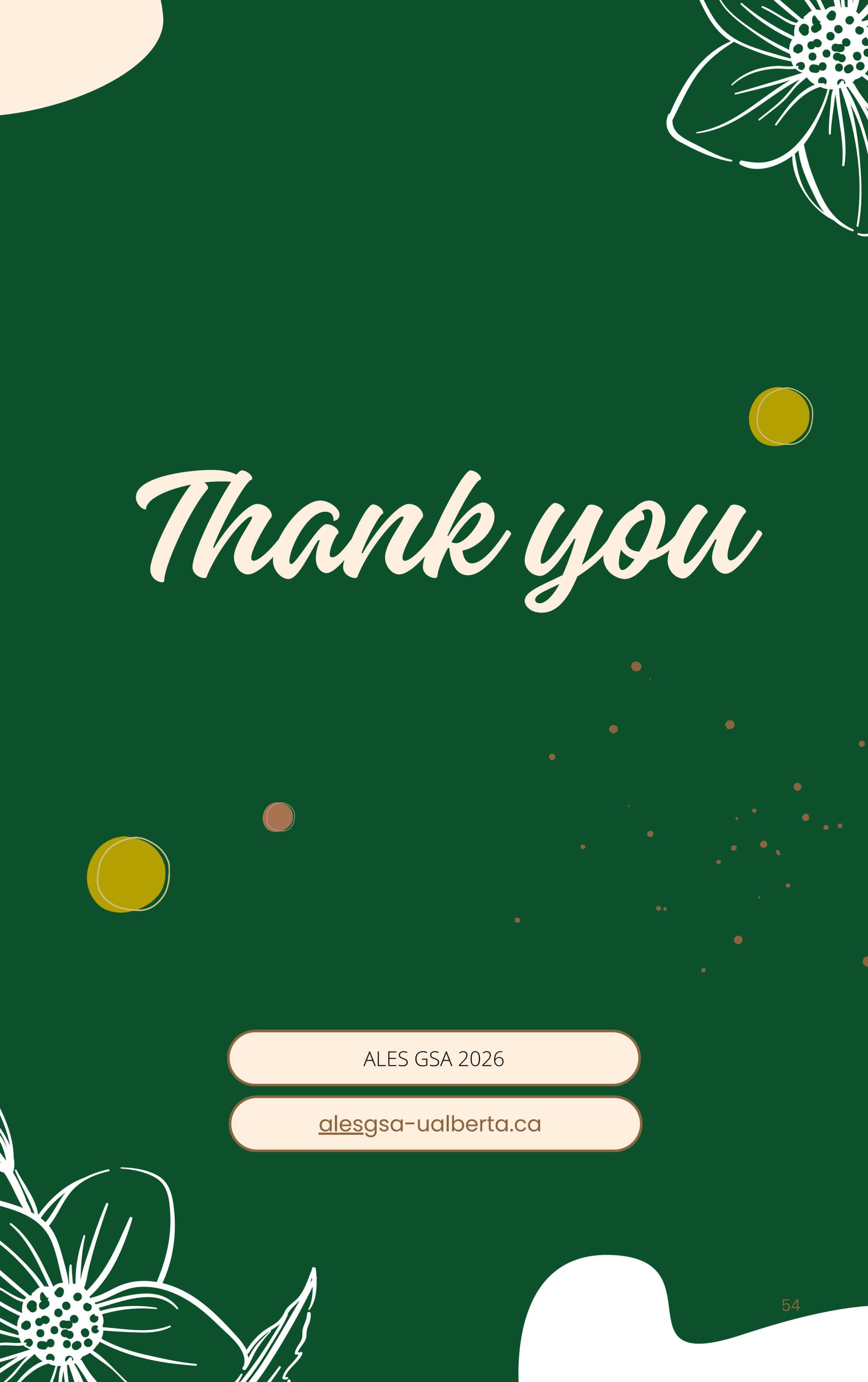
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Big data and Soil Science: Integrating MID-FTIR Spectroscopy and Machine Learning Models to develop predictions for Soil Health Assessment

Soil health refers to the capacity of soil to function as a vital living ecosystem that sustains life and the environment. Several soil health indicators can be effectively predicted using mid-infrared-Fourier-transform Infrared (MID-FTIR) spectroscopy. MID-FTIR spectroscopy measures the absorption of infrared radiation by molecular bonds, producing spectral signatures that reflect the functional groups and molecular composition of soil samples. Conventional laboratory methods are often labor-intensive, time-consuming, and involve the use of hazardous chemicals. In contrast, MID-FTIR spectroscopy, when combined with chemometric and machine-learning approaches, enables the prediction of a wide range of soil physico-chemical properties, including soil organic carbon (SOC), total nitrogen (TN), total inorganic nitrogen (TIN), phosphorus (P), potassium (K), sulfur (S), bulk density (Db), electrical conductivity (EC), cation exchange capacity (CEC), soil pH, and soil texture. The primary objective of this study was to evaluate whether integrating MID-FTIR spectroscopy with machine learning models, specifically Partial Least Squares Regression (PLSR) and Random Forest (RF), can accurately predict soil physico-chemical properties for soil health quantification. Archived soil samples from the Soil Quality Monitoring Program (SQMP), collected between 1998–2006 and 2019–2020 across 42 benchmark sites in Alberta, Canada, were used for model development. Bulk soil samples were analyzed to generate MID-FTIR spectra (4000–400 cm^{-1}), which were preprocessed using spectral trimming, Savitzky-Golay filtering, and standard normal variate (SNV) correction. Machine learning models were developed using a 75% calibration and 25% validation split, and model performance was evaluated using the coefficient of determination (R^2), root mean square error (RMSE), and ratio of performance to deviation (RPD). Overall, both models demonstrated good to very good predictive performance for six soil properties, including SOC, soil pH, total nitrogen, CEC, clay, and sand. The results of this study support the use of MID-FTIR spectroscopy combined with machine learning models as a rapid, cost-effective, and reliable alternative to conventional laboratory methods for quantifying soil physico-chemical properties and assessing soil health.

Keywords: Soil health; MID-FTIR Spectroscopy; Machine learning; Partial least square regression; Random Forest.



Thank you

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