
RUSS EDWARDS
SCHOOL
Agriculture & Environment
2023-24
ANNUAL APPLIED
RESEARCH
REPORT

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$5.27M

total research funding awarded in 2024, a 203% increase over 2023

10

student-led industry partnered Capstone applied research projects

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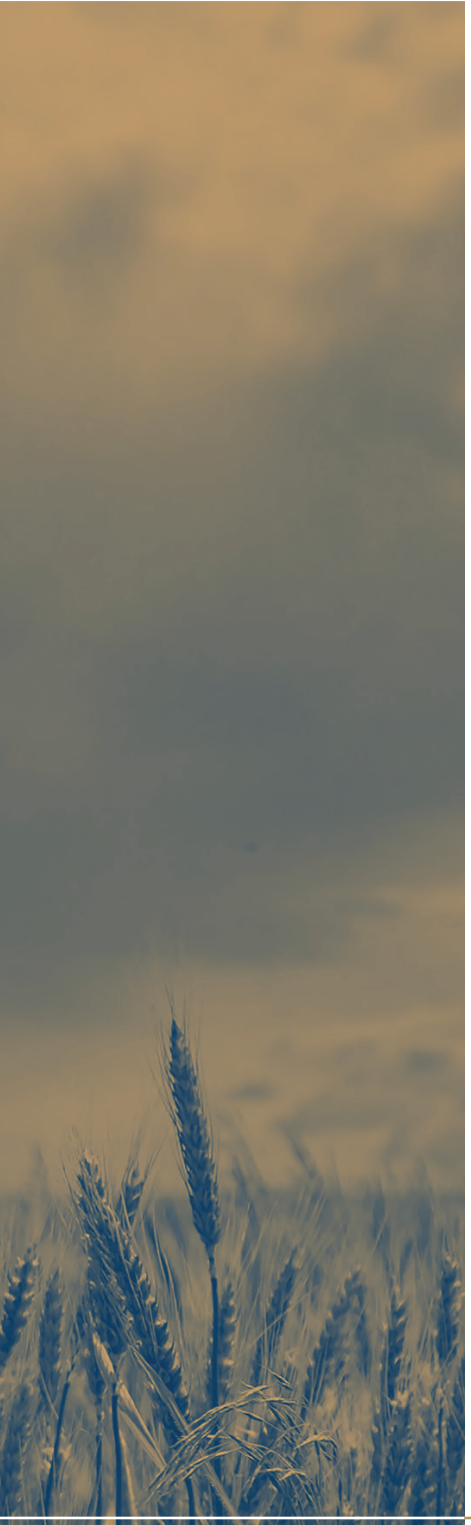
3 day, International conference hosted by Assiniboine College in Brandon Manitoba



MESSAGE FROM DR. DEANNA REXE

It has been another year of exciting growth for Assiniboine College and the Russ Edwards School of Agriculture and Environment Applied Research group. The College has a new name, new logo, and new Strategic Plan to take us to 2030. The research team has again been very successful in receiving project funding from a variety of sponsors and is embarking on the expansion of the North Hill greenhouse complex with 3 new greenhouses, expanded header house, and a new Root Zone Laboratory. There was also a significant increase in the number of Assiniboine students participating in applied research work on projects spanning the province both over the summer and through the fall and winter. Assiniboine's focus of "Learn By Doing" supports students to participate in all stages of research which supports the development of vital employment skills such as problem solving, leadership, communication, collaboration, and entrepreneurship through competencies in logic, critical thinking, work ethics, professionalism, and fundamental workplace health and safety. This annual report outlines the foundation for the College's strategic commitment to become a top 50 research college in Canada by 2030.

Dr. Deanna Rexe
Vice-President, Academic

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provincial research showcase event hosted by Assiniboine

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multi year applied research projects funded under the Sustainable Canadian Agricultural Partnership which is a 5 year investment by Canada's federal, provincial and territorial governments that supports Canada's agri-food and agri-products sectors

MEET OUR RESEARCH TEAM

Sajjad A. Rao, PhD, P.Ag. has expertise in product evaluation, development and commercialization of new crop genetics and sustainable technologies adaptable to climatic changes. Experienced in planning, designing and implementing sustainable technology development programs for the optimization of energy uses, crop production, and product performance evaluation and launching new products, registration of new hybrids and varieties. Qualified Canadian plant breeder, experienced in crop variety characterization and in investigating adaptability and DUS trials with public and private institutes and universities for product accreditation and registration. Generated large field plot data, analysed data using different statistical software's, including ARM, SAS, SPSS, Co-Stat for summaries based statistical interpretations and prepared efficacy and soil residue trials reports. Knowledgeable and experienced in operating small plot machinery, trials layout and setup, multi-location product efficiency, environmental testing and soil profile evaluation. Advanced and registered crop hybrid/variety for Public Coop testing with Prairie Grain Development Committee and production registration authorities.

Poonam Singh Ph.D. P.Ag.
Dr. Singh's research focuses on developing sustainable technologies for the greenhouse production of horticultural crops, evaluating new soilless media/substrates, hydroponic crop cultures, vertical farming, and horticultural crop physiology. Dr. Singh aims at developing sustainable practices and improving the production efficiency of horticultural farms. Dr. Singh's research is helping growers in reducing production costs, increasing resource efficiency, and contributing to long-term economic and environmental sustainability.

Baljeet Singh, Ph.D., P.Ag. is a professional Agrologist and an active member of the Soil Health Committee of the Canadian Soil Science Society (CSSS). Currently, Dr. Singh's research group is developing, the "Applications of Biochar as Soil Amendment to Improve Health and Quality of Manitoba Soils While Limiting the Carbon Release to the Environment". His research is generating research data on biochar soil applications (product type, product rate, product incorporation techniques) to promote sustainability practices to improve soil health, maintain soil fertility, and minimize environmental carbon release. Dr. Singh has several years of experience in soil sample collection techniques, soil properties laboratory analysis (using conventional wet chemistry methods), soil properties in field prediction techniques (using near-infrared spectroscopy), and soil and crop data collection using RPAS (remotely piloted aircraft systems). Dr. Singh has many years of experience in crop production and precision agronomy consulting. Dr. Singh's research group also offers third-party/research crop pest management trials work, testing chemical properties on their efficacy.

Mr. Grant Nicol, CET, INTET (Canada)
Mr. Grant Nicol coordinates and advises on student applied research Capstone projects in the Communications Engineering Technology Program. He consults and collaborates on Assiniboine applied research projects involving data communication, IoT, AI and wireless systems for data collection. Grant was recently awarded a lifetime membership to the CTTAM for his efforts building awareness and participation in the communications engineering technology field. This distinction goes to those who have made exceptional contributions to the association and the work they hope to accomplish. Congratulations Grant!

Mr. James Hood, MNRM
Mr. James Hood coordinates the Land and Water Management student capstone projects His research interests include water quality monitoring and habitat restoration in Stony Creek (near Franklin MB). He is leading a three year, S-CAP funded project in partnership with Squeal On Pigs Manitoba and Manitoba Pork on using environmental DNA (eDNA) to track invasive wild pigs.

ADJUNCT FACULTY RESEARCHERS

Mr. David Rourke, MSc. (PhD. pending)
David Rourke is the definition of tirelessly looking for ways to improve the farming industry for long term profitability and sustainability. At 67 years of age, he has embarked on completing a PhD. at the University of Manitoba, preparing his thesis "In Search of Net Positive Carbon Grain Farms in Western Canada Innovation in Policy and Practice" He started farming in 1980 on 300 rented acres and has grown the operation to 6000 acres where he has explored the development of farming practices which are profitable, sequester large amounts of carbon, increase crop yields and lead to the elimination of the use of fossil fuels. Dave is the founder of Ag-Quest, an agricultural contract research company which started as a single location and is now operating at five locations across Western Canada. His applied research focus explores the effects of combining separate regenerative agriculture crop production methodologies such as different and multiple cover crops, biological soil amendments and exploring different fertilizer application levels in zero till production. He also has an interest in delayed seed germination in order to spring seed cash and cover crops together and studying the effect of commercially available asymbiotic/non-symbiotic biological products developed to reduce the amount of synthetic N required.

Dr. Wayne Lees
Since 2021, Dr. Wayne Lees is the Coordinator for the Invasive Swine Eradication Project in Manitoba (Squeal on Pigs) and is also the Veterinary Advisor to the University College of the North. He was the Chief Veterinary Officer (CVO) of Manitoba from 2005 to 2014. He has extensive experience in developing policy and legislation dealing with animal health, animal welfare and food safety, including the drafting of legislative and regulatory amendments to Manitoba's Animal Diseases Act, Animal Care Act and for the creation of a new Food Safety Act. Dr. Lees led the development and delivery of updated food safety inspection programs in the provincial abattoirs and provincially registered food processing plants. His team initiated training programs in Good Manufacturing Practices (GMP) and Hazard Analysis Critical Control Point (HACCP) for provincial food processing

APPLIED RESEARCH STAFF

Ken Martens-Research Technician
Having completed numerous courses from Canadian post-secondary institutions specializing in agriculture education and research, Ken Martens holds a Certificate in Prairie Horticulture and a provincial pesticide license. His educational background includes studies at Assiniboine College, Olds College, University of Saskatchewan, University of Manitoba, and University of Guelph. Since 2012, Ken has served as a Research Technician and grower for applied research projects at the Russ Edwards School greenhouse complex and grow plot. In this role, he oversees integrated plant management and pest and weed management. Beyond his technical duties, he serves as an Educational Assistant for the Horticultural Production and Sustainable Food Systems programs.

Dustin Bauer-Research Assistant II
Recently joining the Russ Edwards Applied Research team as a Research Assistant Level II, Dustin is an Assiniboine graduate of the two-year Diploma in Land & Water Management. His introduction to the team follows a productive summer in 2023 when he served as an Assiniboine College Summer Student, collaborating with Dr. Baljeet Singh. Dustin's background is marked by a diverse range of experiences. Growing up on a mixed farm provided him with early exposure to agriculture, while the following fifteen years were dedicated to roles in drilling, pipeline, and facility construction within the oil industry. Additionally, he accrued three years of experience in the plumbing trade. His expertise extends to a robust understanding of plant taxonomy, wetland management, and soil management, making him a valuable addition to the research team at Russ Edwards School.

Amber Rae-Research Assistant I
Amber is a Research Assistant I, primarily based at the North Hill campus Sustainable Greenhouse. Amber graduated from the Sustainable Food Systems Advanced diploma program at Assiniboine and has a keen interest in understanding crop production methodologies. Through an AAFC student salary award, Amber was hired as a student research assistant and received her practicum through that position. She enjoys mentoring students and working in the various applied research projects underway at the college.

Jane De Pauw-Coordinator, Applied Research
In her role, Jane De Pauw supports the Applied Research Committee and researchers by exploring and sourcing funding, compiling eligibility information and application requirements, preparing applications, annual and interim scientific reports, and coordinating requests from external funders for financial reporting. She liaises with the College's Research Grants Officer regarding application and reporting submissions, organizes and takes minutes of Applied Research Committee meetings, prepares Memorandum of Understandings, and collaborates with external industry partners. Jane also coordinates and participates in meetings with researchers and industry partners and reviews funding agreements. She joined the College in 2019, bringing with her more than 14 years of experience in research administration from the University of Alberta.

GREENHOUSE IN-A-BOX

PROJECT BY DR. SAJJAD RAO

Assiniboine College and its applied research team have developed a plan for a portable, off grid, sustainable, passive solar greenhouse; "Greenhouse in a Box" for growing certain crops year-round. Based on eight years of data collected and analyzed by Dr. Rao in the College's greenhouse complex, the unit has been designed for ease of use. Electricity is provided by a solar panel system to run grow lights and fertigation unit. The "Greenhouse in a Box" is intended to be operational anywhere in the world, placed on any land, including marginal lands and could be used by individuals, single families or communities. The growing unit will provide an opportunity for any one person to grow food crops for their own consumption or by using multiple units, for businesses, farms and communities to expand to year-round crop production in all climates. The initial unit will be outfitted with multiple sensors to record the indoor temperature, humidity and light intensity in order to study the growing conditions provided by the "Greenhouse in a Box". The data will direct modifications to the original design to optimize crop production.

ACCELERATING AGRICULTURE & INNOVATION SHOWCASE

Russ Edwards School highlights the applied research work of faculty researchers and students in Land & Water Management, Sustainable Food Systems, Agribusiness and Communications Engineering Technology.

On April 4th 2024, the Russ Edwards School of Agriculture and Environment hosted a one day Applied Research Showcase at the historical Fire Hall Venue in downtown, Brandon. Attendees included approximately 70 invited industry partners, guests and students who came to hear the keynote speaker, Dr. Hank Venema from Strategic Systems Engineering Inc.; as well as program/project summary presentations from Assiniboine researchers Dr. Sajjad Rao, Dr. Poonam Singh, Dr. Baljeet Singh and Mr. James Hood. Seven 2nd Year Land & Water students displayed and individually presented their Capstone works, a poster session included a variety of work by Sustainable Food Systems students and project displays were provided by the Communications Engineering Technology Capstone students. Industry partners included Ag-Quest Inc., Manitoba Forage and Grassland Association, Government of Manitoba branches of Agriculture, Fisheries, Resource Stewardship; Prairie Fruit Growers Association, Manitoba Canola Growers, Carbon Lock Technologies and many others. The attendees voted with their Cassie Duck Bucks and the annual Capstone Award went to Shane Hutchings for his project "Reel-In Pollution: Fishing Line Recycling Bins". Enthusiastic conversation and networking made for a very successful event.

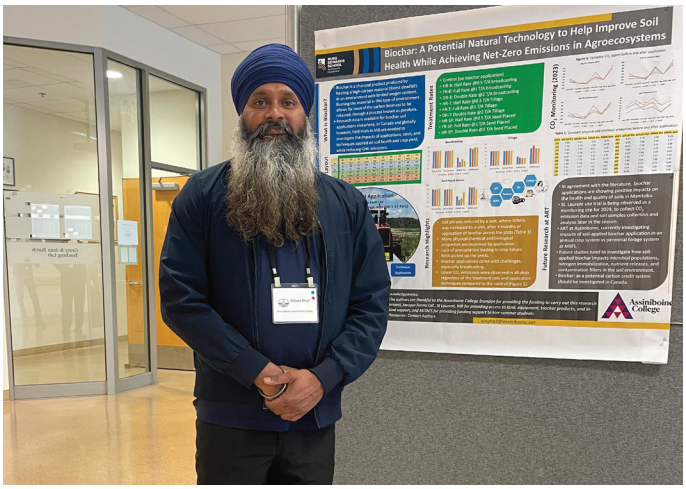
DR. POONAM SINGH SPEAKS AT 4TH ASIAN HORTICULTURAL CONGRESS IN TOKYO

Dr. Poonam Singh was invited to speak at the 4th Asian Horticultural Congress (AHC2023) in Tokyo in August 2023. AHC2023 brought together scientists and experts from around the world to discuss Asian horticulture. The year 2023 was the 100th anniversary of the Japanese Society for Horticultural Science (JSHS).

Dr. Singh presented her research paper entitled, *'Can cattail fibers effectively replace peat in soilless growing media?'* The presented study discussed the potential of cattails (Typha spp.) as a partial substitute for peat within the growth medium, and investigated its impact on both the growth and developmental aspects of plants. The research work presented at the conference was funded by the National Science and Engineering Research Council of Canada, and Agriculture and Agri-Food Canada. The conference brought together more than 700 scientists and experts from around the world to discuss advances in horticulture. The conference provided a platform to discuss the latest advances, new ideas, trends, experiences, and research results with regard to horticultural science.

Dr. Singh also visited various horticultural farms, plant factories and Japanese botanical gardens in Tokyo, Kyoto, and Osaka. She met with other educators and horticulture professionals from Asia and around the world, and developed connections that can be beneficial for future collaborations, partnerships, student exchanges, and new research opportunities.

DR. BALJEET SINGH PRESENTS AT 2024 CANADIAN SOCIETY OF SOIL SCIENCE ANNUAL MEETING: SOIL FUNCTIONS FOR FUTURE GENERATIONS



Dr. Baljeet Singh attended the 2024 annual conference of the Canadian Society of Soil Science, hosted on the University of British Columbia campus in Vancouver, BC in June 2024. This years theme was "Soil Functions for Future Generations" and asked soil scientists to think about how soil can be safeguarded for the future and how the many functions of soil can be in place permanently. This was a 5 day event, bringing together soil scientists and others from across Canada to explore topics such as cover crops, conservation tillage, digital soil management, soil organic and inorganic carbon, soil amendments and regenerative agriculture practises. Dr. Singh presented his poster titled "*Biochar: A Potential Natural Technology to Help Improve Soil Health While Achieving Net-Zero Emissions in Agroecosystems*" which is one of Dr. Singh's areas of applied research. In November 2024, Dr. Singh will head to San Antonio Texas to orally present this same work at the 2024 ASA, CSA, SSSH Annual Meeting.

ADVANCING HORTICULTU
THROUGH RESEARCH

Assiniboine College was established in 1961 as the Brandon Vocational Training Centre, later becoming the Manitoba Vocational Training Centre and finally Assiniboine College in 1969. Assiniboine is an accredited college within the Province of Manitoba offering more than 90 certificate, diploma, advanced diploma, and apprenticeship programs to over 3,200 full-time students in Brandon, Dauphin and Winnipeg, as well as at rural rotating sites throughout the province.

The college has grown over the years, developing a new campus on the North Hill in Brandon where the College's sustainable greenhouse complex opened in the spring of 2013. The greenhouse facility is home to applied research as well as the Horticultural Production and Sustainable Food Systems programs. Assiniboine's expansion continues at the North Hill Campus with the expansion of the greenhouse complex to include 3 new commercial greenhouses, an expanded header house/training space and a new Root Zone laboratory, and the development of the Prairie Innovation Centre for Sustainable Agriculture.

Assiniboine College has been conducting applied research supporting Manitoba's agri-food industry since 2010, growing rapidly from a small cluster of highly committed researchers to encompass research programs, partnerships, and a reputation for solving problems, developing and improving technologies, services and processes. Since 2018, Assiniboine has received nearly $110 million from government, private and not-for-profit partners, along with personnel time, facility access, equipment, and materials. Assiniboine has worked with more than 70 partners in the last 10 years including businesses, industry associations, not-for-profit, Indigenous, industry-government consortia, academia and various local, provincial and federal government departments.

The College's horticulture applied research is led by Drs. Poonam Singh and Sajjad Rao. Drawing from extensive experience in horticultural sciences, Singh's primary research encompasses the development of sustainable technologies for greenhouse-based production of horticultural crops. Her work involves the development/assessment of innovative soilless media and substrates, rootzone management of greenhouse crops, cultivation of hydroponic crop systems, exploration of vertical farming techniques, and the study of horticultural crop physiology. With a demonstrated ability to spearhead research and development projects for the industry, Singh excels in leading initiatives aimed at advancing sustainable practices and enhancing the production efficiency of horticultural farms. She has a substantial track record of publishing numerous research papers in well-regarded academic journal and presenting at national and international conferences. Dr. Singh is also recipient of numerous prestigious grants, including funding from The Natural Sciences and Engineering Research Council of Canada (NSERC), the Canadian Agricultural Partnership (a federal-provincial initiative, Govt. of Canada), Ag Action Manitoba; Employment and Social Development Canada, Agriculture and Agri Food Canada, and the Shastri Indo Canadian Institute, Canada.

Singh's current work is focused on:

- Developing peat-reduced media blends using waste and by-products of the agricultural and timber industry such as wood fibres, plant fibres, composts, and biochar for horticultural crop production. Her work involves standardizing protocols for determining bio-physiochemical characteristics, and to explore these blends as potential components of sustainable growing media that could serve as a viable option for potted plant cultivation and hydroponic vegetable production.
- The evaluation of the suitability of new growing media blends for plant growth and development under protected growing systems. Studies focus on optimizing growing novel partner-supplied media blends for plant growth in the greenhouse and high tunnels to grow crops such as tomatoes, peppers, strawberries, cucumbers, cucurbits, pepper and eggplants.
- Utilizing plant growth regulators that enhance the capacity of plants to combat biotic and abiotic stresses affecting horticultural crops within the controlled environments

RE PRODUCTION
AND EDUCATION

of greenhouses and high-tunnels. The objective is to optimize yield and quality, improve health and vigor, and enhance the adaptability of horticultural crops to challenging environmental conditions.

- Examining the fundamental parameters necessary for the effective operation of an innovative modular freight container farm designed for growing leafy greens. This investigation includes a comparative analysis with traditional greenhouse-based growing systems, aiming to evaluate and contrast their respective operational characteristics.

Dr. Sajjad Rao is an accredited agricultural professional with over two decades of experience in R&D innovations and academic program development and execution. Rao's research focusses on climate changing agriculture, sustainable food production technologies, novel crop genetics development & technology commercial acceptance programs to address and overcome producers' challenges and foster new business opportunities for food production and processing industries. Rao has made significant contributions in sustainable crop production technology innovations for controlled environmental horticulture and developed practices & protocols for climate positive field crop production. Rao is an established plant breeder and developed a novel spring wheat variety suitable for the Canadian Prairies and is well published in the impact of greenhouse microclimates on plant growth and yields, effect of solar energy on greenhouse climates, and varietal studies in strawberry and sweet potato propagation in greenhouse and field environments.

Rao's current work is focused on:

- The evaluation of climate-positive technologies for year-round crop production examining the effect of varied greenhouse design and operation methodologies on crop production parameters (days to flower, days to maturity, total yield; nutrient profile as determined in the research lab) which impact the bottom line of commercial horticulture production. Studies investigate low-cost sustainable technology for greenhouse environmental controls and plant growth performance, climate and plant data acquisition, monitoring and communication systems for maintaining optimum greenhouse climates leading to sustainable crop production systems and optimizing year-round plant performance. Analyses are applied to greenhouse crop yield models for different crop performance under different low, medium and high-tech inputs and protocols.
- Studying the production needs of specific fruit and vegetable crops and identify best performing varieties for Western Canada growers. Research studies and identifies strawberry varieties best suited to early berry production in protected cultivation. Advanced greenhouse management equipment is being used to record and analyze real-time sensor data on temperature, humidity, light spectrum, light intensity, water use efficiency and other growing parameters to adjust light spectrum, intensity or angle, vents, curtains, and other greenhouse components.
- Exploration of greenhouse operations and crop potential and nutrient levels for produce increasingly in demand by Chinese, South Asian, and Afro-Caribbean communities. To meet rising demand, okra, long beans, long and round eggplants, and bitter melon are being tested in the spring and summer when passive solar greenhouse creates warmer conditions suitable to grow these crops.
- Production needs are being explored and nutrient and anthocyanin levels of purple carrots and other purple vegetables (culturally important crop for Indigenous communities) tested in the research laboratory to identify the best variety to use in production. Anthocyanins have antioxidant, anticarcinogenic and anti-inflammatory properties that protect from the risk of cancer, heart disease, diabetes and cognitive function disorders.

Assiniboine College remains committed to a collaborative partner-driven planning process to identify opportunities and respond to industry challenges in various parts of the food system and is using the resulting data to shape and expand its applied research focus for the coming decade.

If you are interested in connecting with the Assiniboine Applied Research group please email **ACC-AppliedResearch@assiniboine.net**

APRIL 2024

WILD PIG SUMMIT BRINGS TOGETHER A WIDE-RANGING DELEGATION IN BRANDON, MB

— BY HARRY SIEMENS VIA **HOG COUNTRY** ONLINE MAGAZINE

Erica Charlton, Director of the Emergency Management Division of Animal Health Canada, urged the public to become aware of and involved in the efforts to eradicate wild pigs from the environment.

Animal Health Canada chairs the African Swine Fever Executive Management Board, which includes representatives from federal, provincial, and territorial governments and the swine sector. This board supports developing and delivering strategies for African Swine Fever prevention, response planning, and preparedness.

To raise awareness of the risks posed by wild pigs and to bring together stakeholders involved in addressing this issue, Animal Health Canada, in partnership with Assiniboine College, Squeal on Pigs Manitoba, and Manitoba Pork, hosted a three-day Wild Pig Summit in Brandon from April 22 to April 24. During the summit, participants discussed strategies and shared knowledge on managing and eradicating wild pigs effectively.

Charlton highlighted that while wild pigs are present across Canada, the prairie provinces are particularly affected. These invasive animals pose significant risks to agriculture and native ecosystems, making coordinated efforts crucial for their management and eradication.

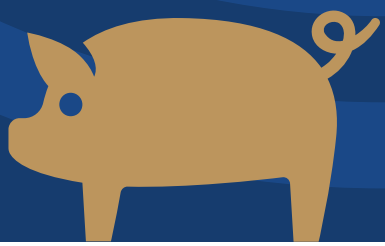
"The wild pigs cause a lot of ground damage with their rooting and the foraging and disturbing crops and things like that, but the real risk is they're carriers of African Swine Fever more than anything," she said.

The World Organization of Animal Health said if someone finds a case of African Swine Fever in the country, whether in domestic pigs or feral pigs, there will be trade implications, and officials will close the borders.

Charlton expressed significant concern from the commercial sector regarding the risks posed by wild pigs. These animals threaten the environment and present potential dangers through the interface between wildlife and domestic animals. There is a particular worry about the possibility of transmitting diseases to commercial livestock, which underscores the need for vigilant management and eradication efforts. The environmental impacts of wild pigs are also a major concern, affecting both agricultural lands and natural ecosystems.

Charlton noted that while provinces have been working independently on wild pig management, the summit aimed to unify efforts, share knowledge, and learn from each other to create a cohesive national strategy. This collaboration brought all the right people together, built awareness, and educated them on what is happening in different jurisdictions regarding research, communications, and field tools.

> The World Organization of Animal Health said if someone finds a case of African Swine Fever in the country, whether in domestic pigs or feral pigs, there will be trade implications, and officials will close the borders.



"The ultimate goal is to eradicate wild pigs, supported by a 10-year strategy that needs thoughtful implementation," she said.

Wild pigs are present across Canada, with hotspots in the prairie provinces, particularly outside Brandon, where established populations are breeding and thriving. There are reports of sightings in Ontario and British Columbia. The focus is on established populations because they grow and create significant risks.

Wild pigs cause significant ground damage through rooting and foraging, impacting crops and natural habitats. The primary concern is their role as carriers of African Swine Fever, which can lead to severe trade implications if detected in any pig population. If officials find African Swine Fever in a country, it results in trade restrictions for domestic or feral pigs. This poses a risk of disease transmission between wildlife, domestic animals, and commercial livestock, along with environmental impacts.

The summit highlighted progress in tracking and removing wild pigs, with significant efforts reported in Manitoba and Saskatchewan. Presentations indicated that sightings of wild pigs have decreased in some areas over the past five years, suggesting that control measures are making headway. Public reporting via the Squeal on Pigs hotline and website helps track and verify sightings.

The 10-year wild pig strategy aims for eradication. The summit served as a kickoff for more coordinated national efforts, with plans to continue building awareness and stakeholder engagement. The African Swine Fever Executive Management Board, which has been active for five or six years, will continue its work, though its current funding expires at the end of March 2025.

Manitobans are encouraged to report wild pig sightings through the Squeal on Pigs Manitoba website or call the 1-833-SPOT-PIG hotline. Public participation is crucial for tracking and managing wild pig populations. Hunting wild pigs independently is discouraged, as it disperses populations and complicates trapping efforts. There are various resources and links on provincial government websites for reporting sightings and learning more about the initiative.

The summit began a more unified approach to wild pig management in Canada, emphasizing collaboration, public involvement, and strategic planning to protect livestock, crops, and natural habitats from the threats posed by these invasive animals. The strong turnout and active participation in the summit underscore the importance of ongoing dialogue and cooperation among all stakeholders.

Charlton suggested, "If you google "squeal on pigs," you'll find information on efforts in the various jurisdictions to address wild pigs and how to report sightings."

FUNDED PROJECTS

National Research Council | $50,000

Industrial Research Assistance Program (IRAP)-Renewed

Contribution to Organization (CtO)- Assiniboine College Technology Advisory & Support Services for Manitoba SMEs

NRC IRAP plays an important role in the Canadian economy in bringing together the key players in the innovation system for the benefit of small and medium-sized enterprises (SMEs). In order to achieve its objectives NRC IRAP provides contributions to eligible organizations that are providing innovation assistance services to SMEs in Canada. This is the second year that Assiniboine will provide technology advisory and support services (TASS) and business advisory and support services (BASS) for SMEs; including technical, marketing or business advice and information to support the implementation of new technologies or processes for IRAP clients. In the first year of funding, Assiniboine partnered with Carbon Lock Technologies and Typha Co. to explore biochar from waste products as partial replacements for peat in soilless growing media, as well as Myera to study purple carrots for increased anthocyanin and carotenoid contact as food additives. The second year of funding will support continued work with these partners as well as supporting new partners.

Agriculture and Agri-Food Canada (AAFC)- Govt of Canada | $14,000

Youth Employment and Skills Program

Improving soil health and reducing greenhouse gas emissions by seeding biochar with crops

Prof. Dr. Baljeet Singh, P. Ag. is an instructor and key soil science researcher at Assiniboine. He instructs in the Agribusiness, Advanced Agriculture and Environmental Management programs with 50% protected time for agricultural research. His expertise includes soil and soil fertility, agro-ecology, soils/water interactions; environmental chemistry, soil nutrient management in crop production. He is partnered with several producer associations & academia to explore soil health and climate change mitigation. This project explores the impact on soil health and CO2 emissions when biochar is added to the soil at the time of spring field seeding. Under Dr. Singh's supervision, the intern, recent Assiniboine graduate Brittany McDougall, will work in the Soils Laboratory at the Victoria East campus, to sample and test soil samples (with and without biochar) for organic matter content, water and nutrient holding capacity, pH, and soil structure. The intern will collect/log data, prepare soil sample profiles and reports; liaise with farmers, participate in extension, conference presentations, team meetings. This is the second year of the study.

Mitacs | $20,000

Accelerate Internships

Determining optimum fungicide control of Mycosphaerella blight and white mould in peas

With the increase of pea protein processing industries in Manitoba, acres under pea production are steadily increasing. In response, it is important to maximize the yield potential by managing Ascochyta (mycosphaerella) blight inoculum buildup over time by applying commercially available fungicide products that not only effectively control the disease but also show little impact to the environment. In Manitoba, many registered fungicide products are available for the management of Mycosphaerella blight and white mould infections, however, studies show the maximum effectiveness of fungicides occurs if applied at early flowering stage combined with understanding the weather conditions conducive to infection. Field trials will assess the relative performance of different registered fungicide products to guide pea producers to make crop application decisions. Assiniboine, in partnership with MPSG are conducing multi-year field trials comparing the relative performance of fungicide efficacy and impact on the yield of five commercially registered fungicide products in FRAC Groups 3, 7, and 11 in controlling Mycosphaerella blight and white mould diseases in peas in Manitoba. In the summer of 2024, two interns, Assiniboine students Natalia Loureiro

and May Du, supported by the Mitacs Accelerate program and matched funding from Manitoba Pulse and Soybean Growers (MPSG), worked with Dr. Baljeet Singh. This is the 2nd year of funding for the College.

Canada Foundation for Innovation (CFI) | $1,000,000
Research Manitoba | $1,000,000

College Fund Infrastructure Program

Expanding horticultural applied research capacity addressing climate change and food security

The CFI College Fund supports projects that enhance the capacity of Canadian colleges to carry out applied research and technology development and foster partnerships that generate innovative products, processes or services that address the social, business, health or environmental needs of a Canadian industry or community. CFI provides 40% of eligible costs for developing research infrastructure to enhance existing applied research or technology development capacity. Research Manitoba offers up to 40% of funding for CFI approved projects. Assiniboine was successful with both funders to support the development of 3 new commercial greenhouses and a root zone research laboratory at the North Hill to support horticulture and sustainable agriculture research. Initial construction is planned to start in Spring 2025 and will take about 12 months to complete. The remaining 20% of costs will be covered by the College and external donations.

Sustainable Canadian Agricultural Partnership | $1,395,000

Strategic Initiatives-Science, Research and Innovation

Advancing Horticulture Production through Innovative and Sustainable Production Practices and Protective Growing System Technologies

The governments of Canada and Manitoba through the Sustainable Canadian Agricultural Partnership (Sustainable CAP) are investing over $1.3 million over five years to Assiniboine College for horticulture production through innovative and sustainable production practices and protective system technologies. This funding supports the continued growth of Assiniboine's applied research and extension programming by uniting agricultural education, innovation, industry collaboration, extension and applied research. This investment builds on the previous 'Field to Fork' funding which provided significant results including exceeding student enrolment targets by over 400 per cent and developing multiple new technologies. This funding will help Assiniboine continue to solve the issues and challenges of the horticulture process, develop new products and technologies and improve business processes and grow their research program to meet the needs of the industry and community.

Sustainable Canadian Agricultural Partnership | $115,320
Manitoba Pork | $42,000

Research and Innovation-Basic and Applied Research

Testing of environmental DNA surveillance methodology for wild pigs in Manitoba

Wild pigs (*Sus scrofa*) are an invasive species in Canada capable of causing significant environmental and economic damage. It is possible that wild pigs could become a vector for the domestic pig disease African swine fever, which would negatively affect the Canadian port export market (valued at $4.71 billion in 2023). Environmental DNA (eDNA) detection has been used to detect wild pigs in other ecological regions and jurisdictions. The first step of this 3 year project, led by James Hood-Assiniboine Faculty Researcher, will adapt the environmental DNA detection methodology to track wild pigs (originally developed in the USA) for use under MB conditions. By detecting (or not) the presence of wild pig DNA in watershed samples, the team will rule out areas with low probability of the presence of wild pigs and focus resources for control in areas populated by the animals. This project will help improve wild pig surveillance in MB.

The second step is to evaluate all existing surveillance methodologies to determine efficacy. The objectives are: 1) Develop a reliable water assay to test for wild pig eDNA to use in MB; 2) Using the refined eDNA protocol, determine areas where wild pigs are present and areas where they are not 3) Evaluate the various surveillance methods used in CAN – eDNA, public sightings, trail camera grids, aerial surveillance, thermal imaging drones, using tracker boars to determine the most effective surveillance methodology or combination of methodologies 4) Share the results with partners, stakeholders and other teams working to eradicate wild pigs. The 2024 field season will be used to test different eDNA sampling methods, focusing on water sampling, for effectiveness, field and lab efficiency, and cost. The intent is to develop detection methods appropriate for cold climate, low density wild pig populations.

Sustainable Canadian Agricultural Partnership | $118, 560
Rourke Farms | $32,373

Research and Innovation-Basic and Applied Research

Developing a process for one-pass seeding of cash and cover crops using delayed germination seed technology-DGST

Cover crops maintain soil quality and productivity. Typically, cover crops are fall planted, but labor, time and equipment are limited due to fall cash crop harvest needs. Cover crops reduce water pollution and absorb more atmospheric CO2; important for climate change mitigation. Spring seeding of delayed germinating cover crops could increase crop yields, reduce machinery costs, out-compete weeds, break disease and insect cycles, host beneficial organisms, attract pollinators, and supply forage. DGST cover crops would emerge earlier, under more optimum growing conditions (soil temperature/moisture availability), support improved stand establishment and yield. This 3 year project, led by David Rourke, Assiniboine Adjunct Professor, will test different seed coating options to identify which can reliably delay the germination of a spring seeded cover crop for up to 80 days. DGST would allow one pass cash and cover crop seeding, providing a positive economic impact for producers and improved cover crop establishment and growth.

Sustainable Canadian Agricultural Partnership | $118, 560
Manitoba Crop Alliance $21,582
Manitoba Canola Growers | $10,791

Research and Innovation-Basic and Applied Research

Bugs in a Jug-testing asymbiotic nitrogen fixing microbes for efficacy on MB crops

Crop yields are often limited by nitrogen availability. Many organizations, including the federal government are promoting 4R fertilizer management to reduce greenhouse gas (GHG) emissions from synthetic nitrogen fertilizer. Sustainably fixing nitrogen from the air and converting it for plants will reduce the dependency on nitrogen uptake from the soil and ensures the plant has access to nitrogen all season long. This nitrogen management solution can help producers maximize yield potential for a broad range of crops, including field and row crops, range and pasture. Increasing the nitrogen (N) fixation ability of crops is a potential method to reduce synthetic N fertilizer use, increase plant nutrient content and improve soil health. Commercially available asymbiotic/non-symbiotic biological products (based on species of bacteria) have been developed to reduce the amount of synthetic N required, while still achieving the same or better crop yields. This 3 year project, led by David Rourke, Assiniboine Adjunct Professor, will test several commercially available N fixing products for use in MB soils.

RBC Foundation | $700,000

Future Launch

The Next Generation of Horticulture Student Program

RBC Future Launch, initiated in 2017, is a 10-year, $500 million initiative to help young people gain access to the skills, job experience, networking solutions and mental well-being supports and services they need to be ready for the future of work. With RBC's help, over the next four years, Assiniboine will educate 100+ students in the Horticultural Production program, from a range of backgrounds including Indigenous students and new Canadians, by engaging them in work-integrated and hands on learning opportunities. Students will benefit from learning skills and knowledge to prepare them to grow foods locally in a sustainable way all year around in a greenhouse environment. RBC's funding will support costs associated with creating an expanded greenhouse space and a greenhouse in a box concept. The greenhouse expansion will comprise a state-of-the-art learning environment, and will receive $500,000 from the RBC. The expanded space will allow Assiniboine to train the next generation of horticulturalists in the latest best practices in sustainable and environmentally friendly techniques for the green economy. The College's programs in Horticulture Production and Sustainable Food Systems will utilize the College's expanded greenhouse for advanced training and help meet the labour demands that the expanding greenhouse industry requires. The greenhouse in a box concept is the result of 8 years of applied research that has taken place in Assiniboine's existing greenhouse space. The $200,000 in RBC funding being directed to the greenhouse in a box concept will allow Assiniboine to build and test the prototype of a free-standing, autonomous greenhouse. This concept does not exist in the marketplace currently. The College's greenhouse in a box concept has the potential to provide stand-alone, affordable, autonomous greenhouses to northern and rural communities so food can be produced locally all year round.

Manitoba Association of Watersheds (MAW) | $626, 273
Manitoba Pulse & Soybean Growers | $18,000
Manitoba Forage and Grasslands Association | $3,000

Agricultural Climate Solutions – Living Labs (ACS-LL)

Launched in 2022, Agricultural Climate Solutions – Living Labs (ACS-LL) is a $185-million program that will allow Agriculture and Agri-Food Canada (AAFC) to build and strengthen a nationwide network of living labs over 10 years. Each living lab brings together farmers, scientists, and other sector stakeholders to co-develop and test innovative technologies and on-farm practices to reduce greenhouse gas emissions and sequester carbon in real-world conditions.

The program priorities for each living lab are to implement projects to:

- Sequester carbon: Canada's millions of acres of farmland have the potential to store carbon and reduce greenhouse gases from the atmosphere. Soil management practices like no-till, cover cropping, and establishing shelterbelts and riparian zones can all help to store carbon to help fight climate change.
- Reduce greenhouse gas emissions: Many on-farm practices for sequestering carbon also help to reduce greenhouse gas emissions.
- Provide other environmental co-benefits: Sustainable on-farm practices not only help store carbon and reduce greenhouse gas emissions, and improve soil and water quality while protecting biodiversity.

Assiniboine was an academic partner on the original application and is now contracted by MAW to deliver the program within the Province of Manitoba, including funded activities. Working with Agri Skills Inc., Assiniboine participated in the initial months of co-development and will over see research projects which are approved by MAW.

IN THE NEWS

ASSINIBOINE TO EXPAND NORTH HILL CAMPUS GREENHOUSE FACILITY WITH $2 MILLION FROM CANADA FOUNDATION FOR INNOVATION AND RESEARCH MANITOBA

A NEW ASSINIBOINE COLLEGE BRAND IDENTITY

ASSINIBOINE STUDENTS HEADING TO ITALY TO LEARN ABOUT LOCAL FOOD SYSTEMS

ASSINIBOINE WELCOMES AG-QUEST FOR INSPIRING FIRESIDE CHAT

GOVERNMENTS OF CANADA AND MANITOBA
INVEST OVER $1.3 MILLION IN ADVANCING HORTICULTURE AT ASSINIBOINE

EDWARDS SCHOOL AT ASSINIBOINE
EMULATES RUSS EDWARDS' LOVE OF THE LAND,REPRESENTS LEADERSHIP IN AG INNOVATION

SOUTHWESTERN MANITOBA COLLEGE
RECEIVES $10M DONATION,
LARGEST IN ITS HISTORY-ASSINIBOINE COLLEGE PRESIDENT SAYS IT WILL TRANSFORM CAMPUS AND STUDENTS

PAMI, ASSINIBOINE COLLEGE JOIN FORCES

ACCELERATING AGRICULTURE & INNOVATION SHOWCASE APRIL 4TH 2024

GRANT NICOL HONOURED BY CTTAM

EXTENSION EVENTS

May 12, 2024
Interviewed at CBC News ", Warmer summers could mean new plants growing in Manitoba" says Sajjad Rao | CBC News" May 12 2024. CBC News Link.

April 4, 2024
Harnessing Waste-Stream Resources in Growing Media for Sustainable Crop Cultivation. Accelerating Agriculture & Innovation Showcase Assiniboine College

April 5, 2024
Presented "Accelerating F.E.W. Sustainable Innovations at Accelerating Research Showcase @ Assiniboine College. Brandon Manitoba.

March 16, 2024
Presented the "ins and outs of growing sweet potatoes in Manitoba" at Brandon Food Council's Community Food Security Series "Seed Starting Workshop" where participants learned about starting seedlings for their gardens at home.

February 13, 2024
Cattail Fibers' as a Peat Substitute in Growing Media. Grow 24 - Manitoba Nursery and Landscape Association Event.

February 14 to 15, 2024
Attended Crop Connect conference, Winnipeg MB. Ag Researchers, farmers, suppliers and growers from all over the country attended the conference. Conference provided opportunity to engage in learning about new technologies, environmental issues, agronomy, farm management practices.

Jan 25, 2024
Presented Webinar "Horticultural Research Initiatives & Research Updates" at Prairie Fruit growers Association Webinar series.

Jan 16 to 18, 2024
Manitoba Ag Days. Chaired Jan 18th Manitoba Ag Days Session. Canada's Largest Indoor event showcasing every aspect of agricultural production expertise, technology and equipment.

November 13 to 15, 2023
Attended MFGA's 7th Annual Regenerative Ag Conference. Conference featured national and international keynote speakers, an outstanding trade show with many opportunities to engage with Ag industry.

October 30, 2023
Participated in Round Table discussion on: "What's the Big Ideas" U of M Ag Researcher asks. Organized by University of Manitoba. Panellists want to know what Western Manitobans think about sustainable agriculture, and wants to hear their ideas.

August 09, 2023
Attended the MCDC crop tour at Carberry, Manitoba. Organized by Manitoba Crop Diversification Centre. The field day included updates on research into groundwater studies, mustard bio-fumigation, herbicide injury on potatoes, pea protein, and soil pit research etc.

PUBLICATIONS

Singh, P. and Rao, S. (2024). Effect of curing methods on Botrytis neck rot disease of onions in the Canadian prairies. *Acta Horticulturae*, 1398, 171-178. https://doi.org/10.17660/ActaHortic.2024.1398.23

Pauw, J.D., Singh, P., and Rao, S.A. (2024) Advancing horticulture production through research and education". *Greenhouse Canada magazine*, January 11, 2024. Page 16-19. Greenhouse Canada.

Rao, S.A and Singh, P. (2023)., Sustainable Passive Solar Greenhouses: A viable option for propagating sweet potato (Ipomoea batatas L.) slips for colder climate regions. *Sustainable Agriculture Research Vol. 13*, # 1.pp 50-60. DOI:10.5539/sar.v13n1p50

Singh, P. (2023). Can cattail fibers effectively replace peat in soilless growing media?
Acta Horticulturae (accepted for publication).

Singh, P., Rao, S., Bisht, V., and Gonsalves, T. (2023). Direct-seeded versus transplanted onions: Varietal Performance in Canadian Prairies. International Journal of Vegetable Science (under review).Rao, SA, Hendricks, B., Gray, A., and Singh, P. (2023). Culinary Treatments Affect Sensory Attributes and Consumer Preference for Sweet Potato Cultivars. *Journal of Food Research* 12(1): 2023

Rao, S.A., Gonsalves, T., & Singh, P. (2023).Black plastic mulch affects soil temperature and yield of sweet potato under short season temperate climates. *International Journal of Vegetable Science* Volume 29, Issue 1.

EXTERNAL EXAMINER PHD THESIS EVALUATION

Dr. Sajjad Rao evaluated PhD thesis entitled "*Exploring regeneration and transformation system in locally developed tomato and expression analysis of HBsAg gene in transgenic tomato*". Appointed External Examiner to evaluate PhD Thesis by the Vice-Chancellor Quaid-i-Azam University Islamabad.

Knowledge transfer and dissemination is a cornerstone and one of the strengths of Assiniboine College's applied research program. Our research team use several different approaches to ensure that research results are disseminated to those groups, industry partners, stakeholders and users who will benefit most from the research conducted.

STUDENT CAPSTONE ABSTRACTS

Capstones are short term, student-led applied research projects based on an industry partner's information gap. This work is a requirement for graduation for many Assiniboine programs. These are the abstracts for the College Land & Water Management 2 year diploma program.

Assiniboine North Hill Campus Rain Garden: A Model for Sustainable Landscaping

Dustin Bauer

Urban areas expose streams, rivers, wetlands, and coastal zones to various risks related to both contaminants and hydrology from stormwater runoff and urban discharge from storm drains. The resulting hydrologic threats create symptoms of what is known as "Urban Stream Syndrome." Rain gardens provide many benefits that help relieve the symptoms of Urban Stream Syndrome including flood mitigation, water purification, and aquifer recharge. By constructing a rain garden at Assiniboine's North Hill Campus, the college will have the opportunity to demonstrate leadership and help promote sustainable practices within the community.

Reel-in Pollution: Fishing Line Recycling Bins

Shane Hutchings

The capstone project aims to tackle the problem of fishing line pollution along the Assiniboine River by creating a community-based fishing line recycling program. The key objectives are to reduce harm to wildlife caused by discarded fishing lines and raise public awareness about the importance of proper disposal. The project involves researching fishing line recycling, building and, in partnership with the City of Brandon, installing recycling bins at strategic locations like Dinsdale Park and the 18th Street Bridge, and producing educational materials to be displayed on the bins.

A Farmers' Guide to Identifying Blue-green Algae in Livestock Watering Sources

Brittany McDougall

Blue-green algal blooms have been observed across various water sources in the province. Fueled by excess nutrients like phosphorus and nitrogen, these blooms can severely impact water quality and pose risks to the health and productivity of livestock due to the potential production of cyanotoxins. They primarily contaminate watering sources such as dugouts and wetlands, posing significant risks to livestock. Algal toxins have been detected in Manitoba's water bodies since 1951 and have been occurring more frequently in recent decades. This guide will assist farmers and livestock owners in recognizing potentially harmful algal blooms by providing visual aids and descriptions, preventing harmful toxin exposure and preserving water quality on agricultural lands.

A Hunters Guide to Help Safeguard Endangered/Threatened Avian Bird Species in Southwestern Manitoba

Peggy Miller

Southwestern Manitoba is home to 26 endangered and 15 threatened bird species, vital for ecosystem balance. Their decline threatens the breakdown of food chains and ecological processes. Hunters may be unaware of these species in the area and could unintentionally harm these high-risk species. Rifle hunting poses risks such as lead poisoning from discarded ammunition as they can accidentally ingest the ammunition, which can lead to neurological damage, reproductive issues, and possibly death. The goal of this project is aimed at educating hunters on these bird species habitats and the effects of hunting around them. This will assist in the conservation efforts aimed at safeguarding these high-risk species.

Beavers as Bio-Engineers: A Guide to Creek Restoration in Manitoba

Finn Rachul

With the increase in beaver populations and a gap in sustainable management techniques, conflicts between humans and beavers are on the increase. Localized indigenous knowledge alongside with Western science provides an opportunity to re-examine the status of beaver management in Manitoba, and to combine these two knowledge systems to better manage and restore the damaged water systems of the area. Using the knowledge that is out there, such beaver culverts or indigenous environmental assessment, we can create an accessible and straightforward guide to manage beaver conflicts with humans, implement beaver projects everywhere, and restore our natural landscapes.

Quack Attack: How To Make Your Farm More Duck Friendly

Caitlyn Stevenson

Conservation of waterfowl populations is extremely important as they play a crucial role in nutrient cycling, seed dispersal, and supporting predator-prey dynamics. The Prairie Pothole Region is crucial breeding ground for roughly 50-70% of North Americas waterfowl populations. Nearly 70% of wetlands in the Prairie Pothole Region have already been lost due to fragmentation, urbanization, and degradation. For those interested in improving waterfowl population, there is not just one resource with information on how one can help. To improve habitat availability in the Prairie Pothole Region, this project is to create a comprehensive resource for Manitoba Habitat Conservancy, Delta Waterfowl, and

Ducks Unlimited to provide to landowners/farmers. The guide will include information about artificial nests, best management practices, how to reduce habitat disturbance, etc. The effectiveness of my guide will be demonstrated by implementing techniques listed in it by installing 2 cylindrical nesting structures on a wetland.

Applying the Amphibian Habitat Suitability Model to the Douglas Marsh Area for the Western Tiger Salamander (Ambystoma mavortium)

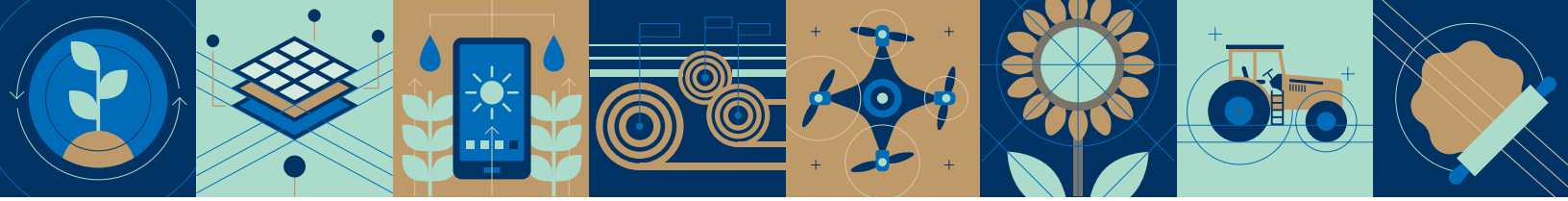
Annie Tan

This project focuses on applying the Amphibian Habitat Suitability Model to the Douglas Marsh Area to assess the habitat suitability for the Western Tiger Salamander. This is an important goal as the species faces habitat loss and fragmentation, threatening its population. Utilizing and applying the Amphibian Habitat Suitability Model allows key areas to be identified within the Douglas Marsh that serves as a suitable habitat for the Western Tiger Salamander. This project aims to resolve the problem by provided valuable insights about habitat requirements, which will aid in conservation efforts and strategies to mitigate habitat degradation and promote a strong and healthy population in the area.

Propagating sweet potatoes: Passive Solar Greenhouse-An Option

Sustainable Food Systems Students and Sajjad Rao

A two year study was conducted at Assiniboine College, Brandon, Manitoba, Canada (49oN, 99oW) in a controlled commercial greenhouse (C1) with two passive solar greenhouse systems (PS1 and PS2) to determine the most efficient and economical way to produce slips commercially. The results from this study indicate passive solar greenhouse, PS1 and PS2 greenhouse technologies, produced comparable numbers of sweet potato slips (286.5, 273.3 per square meter respectively) compared to commercial standard greenhouse C1 (278.8). Days to sprouting of slips between C1, PS1 and PS2 greenhouses differed significantly ($P<0.05$). However, slip growth parameters, including number of nodes, stem diameter and total marketable slips produced in each greenhouse were not significantly different between C1, PS1 & PS2 greenhouses. In conclusion, local slip propagators can use PS1 and PS2 passive solar greenhouses to grow affordable, quality slips for sweet potato growers for timely field production in Canadian growing regions. Additionally, implementation of adapted passive solar greenhouse systems underscores the advancement of passive energy-based technology, which not only diminishes environmental repercussions but also offers year-round production alternatives.



Food as Medicine: Evaluation of purple carrot varieties

Alexandre Antunes De Freitas and Sajjad Rao

A one year study was conducted at Assiniboine College, Brandon, Manitoba, Canada (49°N, 99°W) in field to evaluate five different purple carrot varieties for their adaptability and production evaluation in field under Manitoba Prairies field conditions. Carrot cultivars tested in experiment were Purple Haze (F1) Cosmic Purple, Purple Sun, Deep Purple and Vistaric Sky Blue. Carrot cultivar 'Cosmic Purple' had the highest average total yield followed by the "Purple Haze". However, higher marketable yields were recorded for "Purple Haze" follower by Cosmic Purple" cultivar. A comparable unmarketable root yield was recorded among cultivars except "Cosmic Purple". Anthocyanin and B carotene content and other analytics will be followed at University of Manitoba which will help health researchers as they prepare for health trials for products in which purple carrots powder is used and as a vegetable item in MRE (meals ready to eat). The analytics of the cultivars Increase diversification in the Prairies cropping system that allows better crop and pest management. Use resources efficiently to contribute to economic and environmental sustainability.

Sustainable Growing Media Alternative: Typha based Biochar

Amber Rae[1] and Dr. Poonam Singh[2]

Currently, in Canada, greenhouse growing of horticultural plants is carried out using peat, a soilless media that is extracted from peatlands, sensitive ecosystems with the unique ability to sequester considerable amounts of carbon and store excess precipitation. Peat extraction results in the release of high carbon dioxide emissions into the atmosphere, thus contributing to the greenhouse gas effect and resulting in climate change. This has led to an extensive search for sustainable alternatives for peat by the horticultural industry across the world. Biochar can be produced from a wide variety of feedstocks, ranging from lignocellulosic materials (as wood, reed, and grass) to nutrient rich waste streams as food waste. Carbon-rich biochar produced from organic waste can be utilized to enhance growing media fertility, as it improves structure water retention, and nutrient retention capacity. This, in turn, can lead to improved crop yields and reduced fertilizer requirements. Additionally, the use of biochar in agriculture can help sequester carbon, which is a crucial factor in mitigating climate change. We conducted grow trials using of lettuce (*Lactuca sativa*) 'Bibb' at sustainable greenhouse Complex, North Hill campus, where we tested four media mixes comprising of Typha-biochar (10-40% by volume) and peat. Promix (commercial mix) and 100% peat were used as controls. Media treatments were subjected to 3 sub treatments: No fertilizer, biweekly, and weekly fertilizer of 200 ppm nitrogen. Our results show that greater proportions of Typha biochar in the growing medium corresponded to poorer plant growth. Media blends containing 30% and 40% Typha biochar by volume resulted in suboptimal growth and higher nutrient levels in leachate indicating that the plants were unable to effectively uptake these nutrients. Plant growth exhibited superior performance in response to the weekly application of fertilizer as compared to biweekly applications and unfertilized plants. In future, pre-charging of biocarbon with nutrients might be a significant mean of enabling a slow release of nutrients.

[1]Research Assistant, [2]Professor and Researcher, Horticulture Production and Sustainable Food Systems

Typha Compost-An Eco-friendly Medium for Leafy Green Production

Amritpreet Singh[1], Arshdeep Singh[1], Ramandeep Kaur[1] and Dr. Poonam Singh[2]

The horticulture industry is currently undergoing a process of modernization on a global scale, motivated by the implementation of net-zero transition policies. Acknowledging the pressing need to address environmental concerns, the industry has recognized the need to update and replace peat moss-based soilless growing media with sustainable alternative options. This pursuit of innovative alternatives by horticultural industry is driven by a commitment to sustainability and the recognition of the need for environmental responsibility in the face of changing global circumstances. One of these possible peat replacements are cattails (Typha plants) which contain phosphorus and nitrogen; can be pasteurized to remove potential pathogens and pests and are 100% biodegradable. During the winter of 2024, the grow-trials were conducted at the sustainable greenhouse complex, North Hill campus on lettuce to assess blends of peat with composted typha at 10%, 20%, 30% and 40% by volume. Media treatments were subjected to 3 sub treatments: No fertilizer, biweekly, and weekly fertilizer of 200 ppm nitrogen. Plant growth and health parameters such as plant height, spread, leaves/plant, chlorophyll content, dry weight, and root development were evaluated. The root zone of these plants will be monitored for pH, electrical conductivity, nitrates, phosphates, potassium, calcium, magnesium, and sodium levels. Results showed that mixes containing 10% and 20% of Typha compost, fertilized weekly, demonstrated similar plant growth as those grown in pure peat and

commercial mix, Promix. Nutrient uptake was also better with 10% and 20% of typha compost mixes, and peat and Promix.

[1]Student, Sustainable Food Systems, [2]Professor and Researcher, Horticulture Production and Sustainable Food Systems

Exploring Sustainable Growing Media: Typha Compost

Priyanka[1], Simranjeet Kaur[1] and Dr. Poonam Singh[2]

Peat moss stands as the most widely utilized soilless plant media owing to its favorable chemical, physical, and biological properties. Peat exhibits a low pH, electrical conductivity, and salinity, alongside a high-water holding capacity, total and air porosity. Additionally, it is pathogen-free, readily available, cost-effective, and characterized by consistent properties. Peat moss originates from delicate peat bogs, ecosystems recognized for their exceptional capacity to sequester substantial carbon, promote local biodiversity, and retain surplus precipitation. Harvesting of peat moss contributes to environmental degradation through the depletion of peatlands, releasing carbon dioxide and disrupting ecosystems. These environmental concerns have prompted a widespread search for sustainable alternatives to peat by the Canadian and global horticultural industry. Cattails (Typha plants), recognized as efficient consumers of phosphorus and nitrogen, present a potential alternative to peat. These cattails will be sourced from engineered wetlands to mitigate overall nutrient loading in Lake Winnipeg. Previous findings by Dr. Singh suggest that using Typha in media mixes at lower volumes (10% and 20%) yielded superior results in terms of plant growth metrics (height, spread, leaves/plant, chlorophyll content, dry weight) and root development. Elevating Typha content in the media led to increased nitrogen immobilization through microbial activity. This proposed project aims to achieve the following research objectives 1) determine the optimal rate of mixing compost with standard peat-based potting mixes, 2) evaluate the suitability of new growing media blends for plant growth and development of lettuce. The experiment was conducted during February-

March, 2024 at the sustainable greenhouse complex, North Hill campus. Our investigation unveiled that only mixes containing 10% Typha compost fertigated weekly with 200 ppm N yielded results comparable to pure peat and Promix with regards to plant growth and development. Additionally, the management of pH, electrical conductivity (EC), nitrates, phosphates, potassium, calcium, magnesium, and sodium in the root zone of Typha compost mixes was not as effective as that of 100% peat and Promix.

[1]Student, Sustainable Food Systems, [2]Professor and Researcher, Horticulture Production and Sustainable Food Systems

A Study on Biochar based Growing Media

Sumeet[1], Parambeer Singh[1] and Dr. Poonam Singh[2]

The development of horticulture products derived from Typha plants presents a circular system, wherein captured nitrogen and phosphorus from agricultural runoff is given a second life. Harvesting Typha plants at key influent locations is critical to overcome non-point-source pollution in fresh water lakes and for wetland restoration. We are investigating the suitability of Typha as a component of growing media for partial replacement of peat. Dr. Singh's previous research indicated that incorporating Typha into media mixes at lower volumes (10% and 20%) produced better outcomes related to plant growth metrics (height, spread, leaves per plant, chlorophyll content, dry weight) and root development. However, higher Typha content in the media resulted in increased nitrogen immobilization due to high microbial activity. The current project seeks to investigate the impact of composting on nitrogen stabilization within raw Typha fibers and assess the viability of using the composted product in peat-reduced media blends for grow trials. The hypothesis posits that composting raw Typha fibers with biochar as an additive in soilless media will effectively manage nitrogen immobilization through a controlled microbial degradation process, establishing an optimal carbon-to-nitrogen ratio. The expectation is to successfully increase the proportion of Typha to more than 10% in the peat-reduced media. We conducted grow trials at sustainable greenhouse complex, North Hill campus with a short-season horticultural crop (lettuce) by evaluating various blends of peat with composted Typha (with biochar), ranging from 10% to 40% by volume. Plant growth and health parameters, including plant height, spread, leaves per plant, chlorophyll content, dry weight, and root development, will be systematically examined. The root zone of the plants was analyzed for pH, electrical conductivity, and other macro-nutrients. We found that Typha composted with biochar (made from Typha) has not been very effective in managing nitrogen immobilization, and proportion of Typha to more than 10% did not function well for growth of lettuce plants. Even the mix with 10% Typha biochar + 90% peat performed poorly when fertilization was at bi-weekly intervals, or no fertigation was provided.

[1]Student, Sustainable Food Systems, [2]Professor and Researcher, Horticulture Production and Sustainable Food Systems

Soil & Soil Fertility AGRC-0290

Michelle Foote, Sweet Selma

Soil & Soil Fertility course is offered in the Agri-Business and Agri-Advance Diploma programs at the Russ Edward School of Agriculture and Environment, at the Assiniboine College, Brandon. In this course, students investigate the nature and properties of soils, i.e. how physical, chemical, and biological properties and processes within soil influence crop growth and development. Students take soil samples from Manitoba farms and learn soil testing, and soil test interpretation to match the nutrient requirements of crops of Western Canada. Students test more than 10 basic soil properties and use the knowledge to build basic crop plans for model Manitoba farms. Students also learn to determine crop nutrient requirements, and deficiency symptoms and select proper fertilizer application techniques based on sustainable soil management practices. This course prepares students for decision-making as it relates to soil collection and testing, crop nutrient calculations, fertility planning, and application of agricultural fertilizers using suitable agricultural practices.

CAPSTONE PROJECT AIMS TO PROTECT MANITOBA WATERWAYS

SHANE HUTCHINGS – LAND AND WATER MANAGEMENT

"I was introduced to fishing at a pretty young age, so I always enjoyed it and every time I go out there, you always see fishing line on the ground. It ends up harming animals and wildlife. So I thought that picking it up and recycling it would be a good idea for the Assiniboine River."

That's Shane Hutchings, a second-year student in Assiniboine's Land and Water Management program, explaining his capstone project – an invention to address the challenge of abandoned fishing line along and in Manitoba's lakes, rivers and streams at the Earth Day celebration at Brandon City Hall on April 22, 2024. Shane was invited to share his work focusing on environmental awareness.

Fishing line is a common source of plastic pollution, as it often gets discarded improperly and ends up in rivers and lakes. This can harm aquatic life, entangle animals, and contribute to the growing problem of plastic waste.

In response to those dangers, Shane has created a purpose-built recycling bin capable of receiving discarded fishing line and storing it until the bin is emptied for recycling.

The bin is made from a two foot-long piece of PVC pipe, with a 90 degree elbow at the top and a threaded adapter and plug at the bottom. It's a simple, durable design that results in an easy and economical opportunity to make a positive impact for our environment.

"A fishing line recycling project is a practical and impactful way to address environmental concerns, reduce waste, and engage the community," he says. "This can help create a sense of environmental stewardship, and encourage people to take an active role in protecting their local waterways."

He adds that "Fishing line is made from durable, non-biodegradable materials like nylon or monofilament. Sending these materials to landfills contributes to the growing problem of plastic waste. By providing recycling bins, the project aims to divert this waste and give the fishing line a second life, including being repurposed into new products such as tackle boxes, fish habitat structures, and even new fishing line."

This not only benefits the environment but also creates opportunities for new industries and job opportunities related to recycling and upcycling.

Shane knows that his recycling bins could be manufactured and sold at a profit, but he feels that protecting the environment is more important than making money from the project.

"I've done a process document and a client document that I've been handing out to people," he says. "It teaches you how to build one of your own. So, I'm hoping that other people can make them for themselves too."

Looking to the future, Shane will be working with Ducks Unlimited this summer and is hoping to build a career in the environmental field over the long term.

With that goal in mind, he has this advice for people who are fishing and their line becomes tangled: "Just think about the environment. Instead of just throwing the line away, recycle it. You might be saving another life."

THANK YOU TO OUR PARTNERS

Manitoba Pulse Soybean Growers

Ag-Quest Research You Can Trust

myera Group

Farmer's Hive Think Connected

Manitoba forage & grassland Association

Prairie Fruit Growers Association

vermillion Growers

Carbon Lock Tech

Manitoba Association of Watersheds

typha co.

EMILI Accelerating Digital Agriculture

Weston Family Foundation

Manitoba Pork

Squeal on Pigs!

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