PARTNERING TO ADVANCE ONTARIO'S AGRICULTURE SECTOR

ONTARIO'S UNIVERSITIES

Ontario's universities are partnering with industry and communities to help drive economic growth and advance the province's agriculture sector. By strengthening the agriculture talent pipeline, driving sustainability in the agri-food industry, and transforming agriculture through AI research and innovation, universities are helping ensure Ontario has a highly skilled workforce, sustainable solutions and technology to support a healthy province.

The University of Guelph, for example, has a reputation for driving research and innovation in agriculture as Canada's food university and continues to advance hands-on learning opportunities and research through diverse programs, such as Applied Plant Biology.

Below are more examples of the many ways Ontario's universities are leveraging their talent and expertise, alongside their partnerships with industry, to foster innovation in agriculture and support the future of farming and food production across the province.

Strengthening the agriculture talent pipeline

- The **University of Guelph** launched a free online course, "Foundations in Agricultural Management," to support advanced agricultural business skills, created in collaboration with RBC Future Launch and FCC. By July 2024, over 12,500 people had registered and over 3,000 had completed it, gaining insights into business strategy, farm management, succession planning and financial fundamentals. This initiative addresses the evolving needs of Canada's agriculture industry, where operators must acquire new skills to manage increasingly complex farm operations and ensure future growth.

- To foster student talent in the agriculture and natural resources management space, **Lakehead University** offers a course-based Master's degree in Forest Management equipping students with management practices and hands-on knowledge. This 16-month program prepares students for rewarding careers in agriculture, forest management, geomatics, and ecology. The students are doing an internship over the summer. Lakehead University also has an Agriculture Research Station (LUARS) to support research and training in agriculture.

- Helping counter growing global challenges related to food production and environmental sustainability, **Trent University** offers a specialization in Small-Scale Farming. This unique program prepares students for future careers in sustainable, regenerative farming practices, and teaches them how to contribute to resilient regional food systems through real-world learning experiences in farming, distribution and food preparation.

- Through a two-week faculty-led international field course in Costa Rica, twelve **Nipissing University** students had the opportunity to gain hands-on experience in sustainable development. Guided by the United Nations' 17 Sustainable Development Goals, the students learned about research and extension projects from Indigenous and other community organizations, including sustainable tourism and agriculture production, and their efforts to sustain culture, land and economic opportunities for future generations.

Driving sustainability in agriculture

- By working closely with the local foraging community, two students at **Laurentian University** are testing wild, urban foods for metal and nutrient content. Through the collection of fiddleheads and mushrooms, the study found that metals remain in the soil, and are not being taken up by the plants, making this valuable information for foragers looking to responsibly and sustainably harvest food.

- To help revolutionize how the agricultural industry cares for its crops, **McMaster University** and Suncor have partnered to drive new advancements in sustainable agriculture. They have developed a new type of soft chemical spray that can be used to increase agricultural yields while reducing the amount of harsh chemical sprays needed to protect crops, reducing negative environmental impacts and improving sustainability and good health.

- Through the use of innovative, solar-heated greenhouse design, researchers at **OCAD University**'s SymBioLogical Lab are helping provide food security on an individual and community level. The goal of the project is to design passive solar-heated greenhouses to allow winter urban agriculture in Toronto and other northern cities without using carbon dioxide emissions from heating.

- To help fuel innovation in the Canadian food industry by improving sustainability and supply, Ardra Inc., a start-up launched by a **University of Toronto** PhD graduate, is replacing natural flavour ingredients in food with more sustainable alternatives manufactured using precision fermentation. This successful startup has raised more than $4 million in funding by driving growth in Canadian bio-manufacturing and bio-industrial innovations.

- To transform how fruit is grown in Canada and around the world, **Toronto Metropolitan University** researchers have joined forces with the Weston Family Foundation through the Homegrown Innovation Challenge. This interdisciplinary collaboration extends beyond berries and uses new agricultural technologies to create autonomous farms that produce fruits and vegetables year-round, while preserving natural resources, and providing equal access to affordable and nutritious food for Canadians.

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Northern food security is a key focus at the **Wilfrid Laurier University** Centre for Sustainable Food Systems, where they engage researchers, local practitioners and students in community-led projects to build more resilient food systems. One undergraduate student, for example, worked with research partner Ecology North in a community-led summer project to help make locally grown food accessible and affordable to northern communities.

Transforming the future of agriculture with AI

By driving innovation with AI for small-scale farmers, researchers at **Carleton University**, with funding from the Ontario Ministry of Agriculture, are helping create a more inclusive and diverse agri-food system across Canada. They are retrofitting new tractors with sensors to collect big data using machine learning, along with digital technologies, to advise farmers on when to spray, seed and harvest using a practice-based and hands-on approach.

As climate challenges negatively impact Canada's year-round production of strawberries – a $750 million industry – scientists from the **University of Ottawa** are revolutionizing strawberry production. They are using a controlled environment agriculture platform, along with AI, for efficiency, margins and quality, to create a sustainable, tech-driven, indoor growing fruit-farming model that can produce strawberries throughout the year and eliminate the need for pesticides.

As the use of AI continues to grow, the **University of Waterloo** has been working with Mycro Harvest, part of their Velocity incubator startup program, to develop an AI-driven smart farm. Since mushroom farms are typically not profitable, this startup aims to scale production in the multi-billion-dollar fresh mushroom industry by developing shipping container-sized units that use affordable automation, along with AI monitoring, to grow mushrooms.

In partnership with TELUS, the **University of Windsor** will launch a 5G-connected campus and commercial lab that will spur innovative research and support Ontario's digital economy. The collaboration will also propel multidisciplinary research in the agriculture, advanced manufacturing and autonomous vehicles sectors, as students and researchers build solutions that meet today's global challenges.

Advancing research and innovation in agriculture

A multi-year study on productive lipid barriers by **Algoma University** researchers is key to effectively solving applied problems in forestry and agriculture, including food quality and crop yield. Their research looks at how plants produce lipids, which form crucial protective barriers necessary for their survival in changing environmental conditions. This work will utilize advanced technology to benefit the community and foster global partnerships.

Under the national Clean Agriculture for Sustainable Production project, **Brock University** researchers and industry partners are revolutionizing agriculture in three key areas. The clean plant program identifies virus-free grapevine material, develops production processes for clean plants, adapts next-generation diagnostic tools and maintains a national germplasm repository. The precision agriculture component will study how clean grapevines interact with other plants and organisms and technologies to grow crops more efficiently. A third area will examine how clean plants and advances in sustainable agriculture can be integrated into the greening of urban ecosystems.

Canada's short agricultural growing season historically requires fresh produce to be imported from warmer-climate countries during the winter. Researchers at **Ontario Tech University** have partnered with industry to develop an energy-efficient controlled environment agriculture facility. This innovative facility will help domestic growers use technological advancements to provide affordable agricultural products year-round.

With a focus on advancing sustainable agriculture and local food security initiatives, students at **Queen's University** recently participated in the Social Innovation Hackathon event to develop a new app called Farming Forward. This app will make it easier for all farmers to sell their produce directly to managers at Canada's largest grocery store chains, resulting in cost savings in the supply chain by supporting local farming instead of increasing international food imports.

A net-zero food growing system developed by **Western University** researchers aims to deliver fresh produce to communities throughout the year. They are using machine learning algorithms and data analytics to create ideal conditions for growing food anywhere, in any season. This experimental farm has the potential to deliver harvests year-round, offering consumers relief from grocery prices and bringing fresh produce to remote communities with minimal environmental impact.

With increasing solar storms and a heavier reliance on GPS in agriculture, researchers at **York University** are studying how geomagnetic disturbances impact technology, such as farmers who rely on GPS satellite signals to ensure efficiency when planting seeds and spraying fertilizer. A first-of-its-kind program at York will bring together experts to build technology and infrastructure that is resilient against solar storms and geomagnetic disturbances.