AGRICULTURAL INNOVATION

PHOTO COURTESY OF THE GOVERNMENT OF CANADA

Women in Farming with the Honourable Marie-Claude Bibeau

The **Honourable Marie-Claude Bibeau**, Canada's Minister of Agriculture and Agri-Food, shares her insight on what it means to be a woman in agriculture and what's next for the industry.

What does women's leadership mean to you?
While serving as Minister of International Development, I met so many women leading change under the most extreme challenges. I knew I had to join them in standing up for women, abroad and at home. Today, as Canada's first female federal Minister of Agriculture and Agri-Food, I'm passionate about having more women as CEOs of food or farm businesses, in boardrooms, and in science. The full participation of women is critical to the future of the sector.

What advice would you give to young women who are just entering the agriculture field?
I recently held a virtual roundtable with 14 really impressive female entrepreneurs in agriculture from across Canada. We discussed their personal experiences and identified gaps that prevent women's full participation in the sector. I truly believe that if women had the tools and mentorship they need to be empowered and succeed, the sky's the limit. Through our new Canadian Agricultural Youth Council, we're bringing bright young women and men to the leadership table.

What challenges do women still face in the agriculture industry?
I was an entrepreneur before I entered politics. For 20 years, I've been a co-owner of a campground in my region. I know the barriers women can face as business leaders, be it mentorship opportunities, access to loans, or juggling childcare and family. It can seem so overwhelming! I'm very proud of the new Women Entrepreneurship Program which, through Farm Credit Canada, has already helped over 1,400 women to realize their business ambitions.

What role will the agriculture industry play in Canada's road to economic recovery from the COVID-19 pandemic?
This year, Canada's agriculture and agri-food sector has proven its strength and resilience in the face of a global pandemic. As a leading driver of jobs, GDP, and exports, it now has an opportunity to be at the centre of the relaunch of our economy. Our vision is for a world-leading industry that's sustainable economically, socially, and environmentally.

What excites you about the future of the agriculture industry?
There are so many exciting elements, not only on the horizon, but already happening today! Canada has all the right ingredients to be a world leader in sustainable agriculture, from our innovative crops and technologies to our strong culture of science, and, of course, our world-class producers — women and men alike. The possibilities are truly endless. ■

You Can Make a Difference in the Agri-Food Sector

Ontario Federation of Agriculture

While there are many advantages to working in the agri-food sector, attracting and retaining employees to work on Ontario's farms has been a long-standing challenge. The agriculture industry's national labour shortage is approximately 60,000 workers, with about 45,000 seasonal agricultural workers coming to Canada every year.

The agri-food sector is experiencing a shift — economically, socially, and technologically. Not only are career opportunities increasing, but a change in skills demand and innovation is shaping the next generation. The agri-food sector encourages everyone, regardless of their educational background, to pursue careers in the agri-food sector. Growing and purchasing local food could intrigue today's curious job seekers, and the Ontario Federation of Agriculture (OFA) hopes to inspire those in search of a rewarding career.

In early 2020, OFA launched the Feeding Your Future initiative to address the ongoing labour gap faced by the agri-food industry. The project includes free virtual career fairs, webinars, and training to help match those looking for jobs with agri-food employers. The sector has a wide array of employment opportunities, from positions in science and technology to marketing and communications. While you may expect farms to look for candidates with a farming background, all skill types and educational backgrounds can provide unique contributions to today's agri-food operations, from field to fork.

OFA understands that the incoming generation expects open communication and transparency, positive recognition and workplace culture, an open learning and skill-building environment, and training to support physical and mental health. For those seeking a rewarding career growing food for Canadians and beyond, look no further than the agriculture and food sector for your next employment opportunity. ■

i For more information on how to get involved with Canada's agri-food industry, visit **feedingyourfuture.ca**.

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Growing Food in the Face of Challenge

Ontario Greenhouse Vegetable Growers' commitment to sustainable food production is unwavering, even in the face of unprecedented challenges.

Ontario Greenhouse Vegetable Growers

PHOTOS COURTESY OF ONTARIO GREENHOUSE VEGETABLE GROWERS

The global COVID-19 pandemic has reminded us of how vitally important people are to producing the vegetables that we, as Canadians, enjoy.

Our greenhouse growers have taken tremendous pride in being a part of a food system that has provided Canadians with a consistent supply of fresh, affordable, and accessible food, even throughout the pandemic. But it hasn't been easy.

Safe farms and safe communities

For example, Leamington, ON-based greenhouse grower Nature Fresh Farms recently shared their first-hand experience with a COVID-19 outbreak and the impact on their employees. Their experience was documented in the film *The Hardest Harvest*, which shows the distressing and emotional times their employees faced, and the impact that a serious disruption can mean for our food system and ultimately for ourselves, as consumers.

At the non-profit organization Ontario Greenhouse Vegetable Growers (OGVG), our greenhouse growers have made significant investments to purchase personal protective equipment to support the health and well-being of their employees, both on-farm and in the rural communities where they live. This is in addition to collaborating with government, local health agencies, and agri-food partners to do whatever is necessary to protect employees and mitigate against further exposure and outbreaks.

Trusting the food we eat

OGVG's growers have learned firsthand how to grow food amidst a global pandemic. Our food requires the most vital ingredient to grow: people. Despite the challenges our sector has faced, we're pleased that so many Canadians are taking more of an interest in how their food gets from farm to fork.

According to the 2020 Public Trust Research Data Release by the Canadian Centre for Food Integrity, our Canadian food system's response to the COVID-19 pandemic is being recognized. Eighty-seven percent of consumers trust that the food system will ensure the availability of healthy food for Canadians. It's gratifying to know that the hard work of our growers, farmers, and employees hasn't gone unnoticed.

> **OGVG's growers have learned firsthand how to grow food amidst a global pandemic. Our food requires the most vital ingredient to grow: people.**

Farming for a sustainable future

We recognize, however, that the work doesn't stop here. While our greenhouse sector continues to adapt during these unparalleled times and address what's needed in the short-term, OGVG's also looking at what's required in the long-term for food production. Canadians are making it known that they want affordable food, but most importantly, they want food that's grown and produced in an ethical and sustainable way.

Our greenhouse growers are committed to doing whatever's necessary to produce safe, sustainable food and to keep the well-being of our employees at the core of everything they do. It's why our new campaign, Greenhouse Goodness, focuses on showcasing our greenhouse growers' leadership in sustainability, safety, accessibility, and nutrition. Our growers are committed to pioneering the future of sustainable food production across Canada. Growing vegetables with the future and people in mind is at the heart of everything we do. ■

i To learn more about how Ontario Greenhouse Vegetable Growers is addressing COVID-19 and the future of Canadian food, visit **greenhousegoodness.com**.

This article was **sponsored by Ontario Greenhouse Vegetable Growers.**

ONTARIO GREENHOUSE VEGETABLE GROWERS

Sharing the Exciting World of Agriculture and Food

Ontario charity AgScape is on a mission to educate Ontario students and businesses about agriculture and food.

Tania Amardeil

When it comes to exciting and innovative industries, many are surprised to find agriculture topping the list. Leading agriculture and food education in Ontario, AgScape is a registered charity that increases awareness and ignites student interest in careers in the agriculture and food industries. It also helps companies train new hires from outside the industry through its Business of Food program, allowing businesses to bring on talented individuals lacking agriculture experience.

From the classroom to the corporation

AgScape's Business of Food is a comprehensive online platform that allows educators, post-secondary students, and agri-food businesses to enhance their knowledge and understanding of agriculture and food at their own pace, from anywhere. It's an ideal professional development tool for people looking to enter the industry or for companies looking to widen their talent pool when hiring.

Adapting to the times, this year AgScape has taken its flagship resource, the Teacher Ambassador Program, from an in-classroom experience to a virtual offering. Through the program, Ontario-certified teachers educate students in grades 7 through 12 about food and agriculture in an interactive, engaging way. Using curriculum-linked activities, this encourages students to think critically about agri-food-related issues and exposes them to the sector's many career opportunities. Through AgScape's supporters, these lessons are available free for Ontario teachers.

Now more than ever, AgScape is looking for support from within the industry. People are becoming increasingly disconnected from the realities of where their food comes from, and educating Ontario's two million students about the exciting innovations and opportunities in agri-food is critical.

"We have an incredible team who have been able to pivot quickly during this interesting year," says Taylor Selig, AgScape's newly-appointed Executive Director. "As a team, we look forward to sharing successes and innovations with our supporters and the next generation." ■

Taylor Selig
Executive Director, AgScape

i Want to help bring in new talent and breathe new life and ideas into your organization? Visit **agscape.ca/bof-corporate** for more information.

This article was **sponsored by AgScape.**

AgScape® Leading Agriculture and Food Education in Ontario

How Farmland Investment Can Provide Stability in Uncertain Times

While investing in farmland may not seem like a typical way to diversify an investment portfolio, Bonnefield Financial is showing how farms can be investable assets that can provide stability in uncertain times.

Anne Papmehl

Agriculture is a booming sector and farmland is becoming a hot investment topic. "As a long-term real asset, farmland has attractive characteristics that intersect with a number of key themes we're hearing about from the investment community," says Andrea Gruza, Vice President of Capital Markets at Bonnefield Financial, an investment firm that invests in Canadian farmland through its four investment funds.

Many investors are seeking to diversify away from the volatility of traditional markets and looking at other options for long-term capital appreciation and wealth preservation. "Farmland is typically viewed as that kind of asset due to its historical appreciation and inflation-hedging characteristics," says Gruza. And whereas traditional real estate investments typically come with a mortgage, she notes that, "Bonnefield's model is completely unleveraged and therefore offers less risk and volatility exposure."

Climate trends offer an opportunity for Canadian agriculture

Another factor gaining attention has to do with climate change. Unlike many other food-producing countries around the world like the U.S. and Australia that are increasingly adversely affected by climate events such as droughts and wildfires, Canadian agriculture is seeing some relative benefits from current trends. With unprecedented access to fresh water, lengthening growing seasons, and an increasing ability to grow new crops in northern latitudes, Canadian farms are poised to potentially reap higher yields and accommodate more crop choices. These higher yields and increased production drive farmland prices upwards.

Long-term and sustainable investments

Bonnefield operates on a sale and leaseback model. Commercially-minded farmers wanting access to capital sell some of their land to Bonnefield. They then lease it back and continue to farm the land on a long-term basis. Investors wanting farmland exposure — without having to own and run a farm — invest through one of the four funds.

The result is an investment option that keeps high-quality Canadian farmers on the farm, promotes sound and sustainable farmland management practices, and protects Canadian farmland — all while offering investors an attractive risk-adjusted return profile. Bonnefield's funds also incorporate environmental, social, and governance (ESG) principles, making them suitable options for sustainably-minded investors. "Since becoming a signatory in 2014, Bonnefield has received an annual 'A' rating from the UN-supported Principles for Responsible Investment," says Gruza. ■

i To learn more about Bonnefield, visit **bonnefield.com**.

This article was **sponsored by Bonnefield Financial.**

Bonnefield

What Is Gene-Edited Food and Why Should Canadians Care?

As Canadian agriculture looks to innovation to drive sustainable growth, CropLife Canada is sowing the seeds for plant-breeding innovation.

Anne Papmehl

The seedless grapes, oranges, and grapefruits we enjoy are the result of years of painstaking traditional breeding. Today, thanks to gene editing, plant breeders can create similar tasty and healthy foods at a fraction of the time and cost.

Gene editing operates on the same principle as traditional breeding but with a much higher degree of precision. "Scientists can figure out exactly which part of the genome is creating the desired outcome or problem and surgically make changes within the plant," says Pierre Petelle, President and CEO of CropLife Canada, the organization representing the Canadian plant science industry.

Scientists are using gene editing to focus on changes within the plant's own genome without introducing foreign genes. And it's just as safe as traditional breeding. "All gene editing does is make the process more efficient and targeted than ever before," says Petelle.

Sustainable agriculture, healthier foods, and less waste

In agriculture, gene editing allows scientists to breed plants with specific traits — such as tolerance to extreme weather conditions — at a very precise and localized level. As the impacts of climate change become more acute, the ability to adapt to ongoing changes in growing conditions through gene editing will ensure a sustainable and reliable food production system for Canada.

Other advantages to gene editing include healthier foods, such as trans fat-free soybean oil and high-fibre wheat, and less food waste. On the latter, scientists are working on new varieties of lettuce, mushrooms, and potatoes that slow browning after being cut. "Traditionally, people don't want to eat brown vegetables or fruit, so by adjusting the part of the gene that causes the rapid browning, we're able to extend the shelf life of that product and reduce food waste," says Petelle.

With a tremendous land mass, plentiful natural resources, and growers quick to adopt new innovations, Canada has a long-standing role as a global food producer. Investments in agricultural innovation like gene editing will ensure our global status as well as drive Canada's post-COVID-19 internal economic recovery. ■

Pierre Petelle
President & CEO, CropLife Canada

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To learn more about gene editing and CropLife Canada, visit **croplife.ca**.

This article was **sponsored by CropLife Canada.**

Q&A

Cherilyn Jolly-Nagel, a farmer from Mossbank, SK, shares her insight on the latest advancements in plant breeding.

Cherilyn Jolly-Nagel
Public Speaker & Farmer

How have advances in plant breeding impacted your work as a farmer?

Innovations in plant breeding technologies have been an absolute game-changer for farmers like me. Our family has been farming for more than 100 years on some of the same land, and in the last 25 years we've seen huge advancements in yield, more choice in varieties of seeds, and even new types of crops that have become available to us.

What excites you about the possibilities of gene editing?

Generations of farmers before me have enjoyed the benefits of new technology, and next to the advancements in our equipment, seed technology might be the most exciting! What really excites me is knowing that by embracing gene editing, Canada will be able to continue to lead the world in producing the highest-quality grains, pulses, and oilseeds, and in adopting on-farm practices that are the most sustainable in the world.

What's one of the biggest challenges you face as a farmer, and how might innovation in agriculture help you overcome it?

No matter what the season, farmers like me are constantly negotiating with Mother Nature to bring us the weather we need. Gene editing technology allows us to stay one step ahead and to try to solve problems before they reach a point where they can't be overcome. I want to say "thank you" to the scientists working alongside us to better the agriculture industry.

Jodi Souter, a plant breeder from Saskatoon, SK, shares her thoughts on the possibilities of gene editing.

Jodi Souter
Plant Breeder

What impact have technological advancements had on the field of plant breeding?

Technology has enabled the field of plant breeding to progress from only selecting for visual traits with simple genetic controls to solving complex issues. Technological advancements have made plant breeding a faster and more flexible process, allowing breeders to respond to global challenges.

What excites you about the possibilities of gene editing?

Gene editing is a tool that plant breeders can add to their arsenals and responsibly use to achieve needed improvements in crop varieties. Gene editing allows plant breeders to be precise and accurate in our efforts to solve multi-faceted problems facing the entire food chain — from field to fork.

Why do we need new tools like gene editing?

Gene editing will allow Canada's agriculture sector to continue to be competitive with other countries that have modified their legislation in adherence to a science-based approach. ■

Do You Trust Where Your Food Comes From?

John Jamieson, President and CEO of the Canadian Centre for Food Integrity (CCFI), discusses Canada's food system and how public trust has reached an all-time high.

What is the CCFI?

The CCFI is a not-for-profit charitable organization whose members and partners represent the diversity of today's food system. Consumers have questions about food and their healthy curiosity and skepticism is why we exist. Our sole mandate is to connect the Canadian food system with the consumer and our objective is to have Canadians trust the food they consume and the processes and practices that produce that food.

What's the biggest misconception about where Canada's food is grown and produced?

Our research shows that most Canadians know very little about food production because so many of them are far removed from the process. As a result, I think many people have a nostalgic notion of farming and fishing that's inconsistent with today's reality. Canadian food production is based on science and technology, is more sustainable than ever, and provides food affordability, safety, and security for Canadians.

How has the COVID-19 pandemic impacted the public's trust in the food system?

Confidence in Canada's food system is at an all-time high. The COVID-19 pandemic has presented exceptional pressures, but our sector has adapted, resulting in Canadians feeling optimistic about their food supply. The proportion of Canadians who believe our food system is headed in the right direction has reached a five-year high, and the food system's response to the pandemic has been highly praised by Canadians. According to the CCFI's recent Public Trust Research Data Release, nearly nine in ten Canadians trust that the food system will ensure the availability of healthy food for them and their families.

What is the largest issue that Canada's food system is currently facing?

I think the largest issue the Canadian food system is facing is consistent with every other sector and citizen in the world right now: uncertainty that's attributed to living through the middle of a global pandemic. While COVID-19 has presented challenges, however, it has also offered the Canadian food system an extraordinary opportunity to connect with consumers and to highlight the potential for the agri-food system to lead Canada's economic recovery. ■

John Jamieson
President & CEO, Canadian Centre for Food Integrity

MINISTER HARDEMAN WITH DOUG WAGNER, MAYOR TREVOR BIRTCH, AND KEITH CURRIE. PHOTO COURTESY OF GLACIER FARMMEDIA

New Venture Will Focus on Strengthening Agriculture in Canada

Discovery Farm Woodstock, a new initiative from Glacier FarmMedia, is designed to strengthen Ontario's agriculture sector.

Tania Amardeil

Discovery Farm Woodstock launched in the beginning of September 2020 thanks to the proposed purchase of 100 acres by Glacier FarmMedia, the parent company of Canada's Outdoor Farm Show (COFS). The land is being bought from the province and is the current site of COFS.

Glacier FarmMedia is Canada's leading agriculture publishing and information company, and is known for high-quality, independent farm journalism. The establishment of Glacier FarmMedia Discovery Farm Woodstock provides COFS with a permanent home while expanding its farmer-driven applied research and innovation in sustainability and soil health through a new centre for applied agriculture research.

A world-class collaboration site for agriculture

Discovery Farm Woodstock will showcase farmer-led and industry-partnered research to transfer in-field research to farmers, with the ultimate goal of helping farmers succeed and strengthening Ontario's agriculture sector.

Through the planned development of a new sustainability and soil health centre, the organization aims to bring industry, government, and research groups into collaboration within a classroom and research framework. The goal is to advance soil health information and to find practical solutions for the problems of today and tomorrow to support farmers in Eastern Canada.

"Through the proposed sale, COFS will continue to provide farmers with the vital opportunity to learn about the latest and greatest farming practices and technology," says the Honourable Ernie Hardeman, Ontario's Minister of Agriculture, Food, and Rural Affairs. "The announcement is good news for Ontario's agriculture sector, which will have expanded access to that research, and good news for our community and local economy, which will benefit from year-round activities on the site."

Discovery Farm Woodstock will also feature a student demonstration farm that'll be run in partnership with strategic partners, including Grain Farmers of Ontario. The on-site demo farm will include classroom and workshop space. ■

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To learn more about Discovery Farm Woodstock, visit **discoveryfarm.ca**.

This article was **sponsored by Glacier FarmMedia.**

PHOTOS COURTESY OF OLDS COLLEGE SMART FARM

Digital Transformation Drives Growth in Alberta's Agribusiness

Technology and innovation will help Alberta provide a hungry world with safe, secure, and nutritious food.

Calgary Economic Development

As a critically important industry where a multitude of complex variables can dramatically impact its outcomes, agriculture is the ideal sector to embrace artificial intelligence (AI) and all aspects of digital transformation.

The increased focus on food supply and food security for an ever-growing global population has necessitated even more advances in Canadians' farming practices. Digitization has become a driving force in the evolution of the industry in Canada.

The agribusiness sector — from farmers and ranchers to crop scientists and food processors — is adopting advanced technologies to grow more or new crops, and to improve its products and processes. Canada is the fifth leading exporter of agricultural products worldwide and is one of the few countries with the capacity to expand its exports to a hungry world.

Traditional perceptions of agriculture as simple farming or ranching fail to consider the amount of innovation occurring in agricultural technology (ag-tech), agricultural sciences, ag-finance, and other areas.

AI is transforming agriculture

Cutting-edge technologies including AI and machine learning are transforming the sector. Globally, the application of AI in agribusiness is forecast to grow by more than 25 percent per year through 2025.

A 2019 study from Calgary Economic Development revealed that the agribusiness sector is the fastest-growing adopter of digital transformative technologies in Alberta, with forecast spending increasing by 23 percent from 2019 to 2022. The industry is just scratching the surface on what AI could achieve.

Ag-tech includes the development, design, testing, and production of specialized software and hardware to support core agriculture activities. It's in a position to be a $730 billion U.S. industry worldwide by 2023. The technology can be applied in every subsector of agriculture.

The main application of AI to date is in precision agriculture: using technologies to optimize yield and profitability while maximizing the efficiency of resources such as fertilizer and reducing the use of pesticides.

Precision agriculture is a game-changer

In precision agriculture alone, there are several notable examples of big strides in AI:

- **Animal identification:** Ag-tech companies are developing facial recognition AI for ranchers to track each animal using images or videos of the herd to monitor livestock to assess growth and health.
- **Automation:** Robotics are now integral parts of a farm owner's toolkit. The next wave will be autonomous robots that learn and adapt to the operating environment to adjust machinery in real time.
- **Data analysis and modelling:** With sensors in the ground and drones and satellites overhead, farms can gather data on details from soil health to weather, disease, and pest mitigation. AI reviews data in real time to support well-informed and timely decisions.

When people think of AI they might imagine tech hotbeds such as Seattle or San Francisco, but Alberta's also among the global leaders. Thanks to organizations like DeepMind and the Alberta Machine Intelligence Institute (AMII), some of the brightest minds in AI are in Western Canada.

On top of the advances in smart agriculture and precision farming on the ground, trailblazers across Alberta are working to ensure new, innovative solutions continue to be developed. With primary production, protein development, ag-tech, food safety, and traceability in effect, the province is a hotspot for Canadian and global food and technology suppliers.

The agribusiness sector — from farmers and ranchers to crop scientists and food processors — is adopting advanced technologies to grow more or new crops and to improve its products and processes.

Post-secondaries play a key role

In Calgary, ag-tech successes including Decisive Farming are providing leading precision agriculture solutions, and Verge Ag is developing autonomous farming, using AI to drive agribusiness success.

Post-secondary institutions including the University of Calgary and the Southern Alberta Institute of Technology are also playing a major role in the advances. Just north of Calgary, Olds College is supporting several applied research projects such as animal identification using AI. Its Smart Farm has created a hands-on learning environment where students are applying technology and innovative ideas to create real-world impact from the field to the dinner table.

For the agribusiness sector, digitization and AI are hardly a trend. They're the tools the industry uses as food demand continues to grow and climate change impacts where and how Canadians grow food.

The area stretching from Olds to Calgary to Lethbridge in Southern Alberta is one of Canada's leading agricultural corridors. It has added significantly to agriculture and agri-food products from Alberta, more than doubling in the last 10 years the products that now go to more than 150 countries worldwide.

Agribusiness is a key industry in the economic strategy Calgary in the New Economy, which sets out a vision for the city's future. In September, Calgary Economic Development and Western Economic Diversification Canada released the Agribusiness Market Study, which revealed strong prospects for growth in regional and global markets for the sector.

The study supported increased cooperation among industry players to advance technology. It also found that continued digitization of the sector is the pathway to realizing a prosperous and sustainable agriculture industry in the future. ■

To learn more, visit **calgaryeconomicdevelopment.com**.

Greenbelt Farmers Are Helping Address Climate Change

Climate change is affecting Ontario's agricultural systems. By improving soil health, Greenbelt farmers are helping to reduce climate change impacts.

Anne Papmehl

Stretching over 800,000 hectares of protected land, from the eastern end of the Oak Ridges Moraine to the southern tip of Niagara to the northern tip of the Bruce Peninsula, Ontario's Greenbelt is one of Canada's most productive food-producing regions. It's particularly renowned for two specialty crop areas — the Holland Marsh and the Niagara Peninsula Grape and Tender Fruit Lands — whose fertile soils and unique climate conditions allow Greenbelt farmers to grow crops that are rare in Canada.

But like all parts of Canada, the Greenbelt is feeling the effects of climate change. Excessive spring and fall precipitation, summer drought and sudden storms, and more winter freeze-thaw cycles affect the ability of Greenbelt farmers to produce crops. Wet springs can delay planting, summer drought and hail can kill crops, and frequent winter freeze-thaw cycles can make plants more prone to pests and diseases. All of this results in less healthy plants with lower nutritional value.

Healthier soil improves crop resilience

Greenbelt farmers, who already see the impacts of climate change in their fields, are adapting by focusing on improving their soil heath. For example, increasing organic matter in the soil helps to remove carbon from the atmosphere and increase the plants' ability to retain water. Giving plants a deeper base in the soil helps make plants more storm-resistant. "Essentially, by preparing the soil in advance to be healthier, their crops have an easier time withstanding the impacts of climate change," says Mel Luymes, a freelance writer and soil health expert.

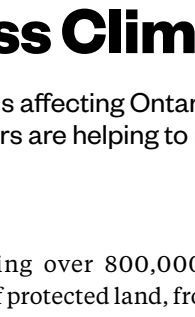
"Healthy soil can hold water longer to resist drought and stick together to mitigate soil erosion," says Luymes. This in turn improves the quality of the water. "On top of that, because plants need to draw down carbon from the atmosphere, the carbon is actually going to further help the soil withstand the impacts of climate change, so it ends up being a win-win, virtuous cycle."

Farmers in the Greenbelt are improving soil health through a combination of traditional farming practices and modern-day technologies and innovations. "Improving soil health by reducing tillage, increasing plant cover, and applying manure is now being further aided by precision agriculture," says Edward McDonnell, CEO of the Greenbelt Foundation, a charitable organization dedicated to ensuring the continued health and prosperity of Ontario's Greenbelt.

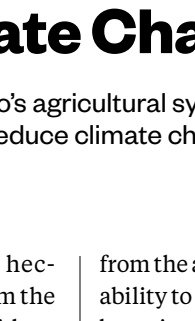
"GPS guidance, drones, and precision machinery are among the modern tools being used to inform farming practices that lead to healthier soils that require fewer pesticides, improve water absorption, and retain more carbon," says McDonnell. "Together, traditional practices and new technology can improve agricultural yields while also improving resilience to climate change."

One of the farmers using a more traditional approach is Owen Goltz of Riverdale Farm and Forest in Inglewood, ON. "By using regenerative farming techniques we're exploring different ecosystems in our farm, preserving topsoil, and using compostable material to put that back into our soil so we can get more diversity in our soil biology and more nutrient-rich crops," he says.

Mel Luymes
Writer & Soil Health Expert



Edward McDonnell
CEO, Greenbelt Foundation



Owen Goltz
Co-Owner, Riverdale Farm & Forest

Supporting soil health research and innovation

The Greenbelt Foundation is supporting research and the adoption of new approaches to improving soil health. "We're working with agricultural organizations across the Greenbelt region to support farmer-led best practice development and knowledge-sharing, like the Erin Soil Health Coalition — an innovative, community-based soil health project in Erin, ON," says McDonnell.

Soil health will continue to play a leading role in the agricultural sector, which has been hard hit by climate change. "We know that soil is the key and that this is what we should've been doing all along," says Luymes. "Climate change is really just telling us to get going." Goltz agrees, adding, "We can't get more nutrient-dense food without paying attention to soil health. And when we do that, the secondary effect is climate change mitigation." ■

PHOTO COURTESY OF THE GREENBELT FOUNDATION

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Learn more about the Greenbelt Foundation's leadership in climate action and agriculture by visiting **greenbelt.ca** and following **@greenbeltca** on Twitter.

IMAGE COURTESY OF FERTILIZER CANADA

Cultivating a World with Climate-Smart Agriculture

Efficient fertilizer management provides not only economic but social and environmental benefits for farmers and all Canadians.

Tania Amardeil

Fertilizer is vital to life. A critical component in the modern agriculture process, fertilizers ensure that crop nutrient demands are met and that soil nutrients continue to be replenished.

The fertilizer industry plays an essential role in Canada's economy, contributing nearly $24 billion annually and employing over 76,000 workers. "We want to make sure that our members can help feed the world," says Garth Whyte, President and CEO of Fertilizer Canada, the industry association that represents manufacturers, wholesalers, and retail distributors of nitrogen, phosphate, potash, and sulphur fertilizers.

Introducing the 4R Climate-Smart Protocol

"Estimates show that about 40 percent of the world's population is alive because of synthetic nitrogen fertilizer crop production," says Dr. Claudia Wagner-Riddle, Director of the North American Centre of the International Nitrogen Initiative and a professor at the University of Guelph's School of Environmental Sciences. "That's the positive side of the story. Unfortunately, nitrogen use also has negative impacts."

Dr. Wagner-Riddle's work focuses on developing accurate measuring systems that capture nitrous oxide (N_2O) emissions and figuring out how to manage agricultural fields to minimize these emissions' negative impacts. With the Liberal government's pledge to reach net-zero by 2050, these types of initiative are essential.

"Our 4R Climate-Smart Protocol is a fertilizer management practice to improve fertilizer management and reduce off-field impacts," says Whyte. "4R is all about applying the right source of fertilizer at the right rate in the right time and the right place." This optimizes plant nutrient uptake, maximizes yield, and increases profitability while also minimizing fertilizer runoff, leaching, and N_2O emissions.

"We can't get away from having to use some amount of synthetic fertilizer, so the question is how we can do it in a way that's environmentally-responsible," says Dr. Wagner-Riddle. ■

Garth Whyte
President & CEO, Fertilizer Canada

Dr. Claudia Wagner-Riddle
Director, North American Centre of the International Nitrogen Initiative & Professor, School of Environmental Sciences, University of Guelph

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For more information on Fertilizer Canada and the 4R Climate-Smart Protocol, visit **fertilizercanada.ca/our-focus/stewardship/climate-smart-agriculture**.

PHOTO COURTESY OF CAAIN

Meet the Canadian Agri-Food Automation and Intelligence Network

Canadian Agri-Food Automation and Intelligence Network

It's no secret that agriculture and agri-food are major contributors to our nation's GDP, accounting for significant sales within Canada and serving as a vital export component, nor is it a secret that our high-tech innovators are world-class. At the Canadian Agri-Food Automation and Intelligence Network (CAAIN), we bridge the divide that tends to separate these two vital sectors, thereby facilitating the kind of collaboration that drives real results.

How do we do that?

By paying for stuff. That's right — we manage a pot of money that Innovation, Science, and Economic Development Canada gave us to encourage important advances in three key ag-tech focus areas:

1. Automation and robotics
2. Data integration, analysis, and decision-making
3. Smart farms

The way it works is that individuals or organizations with big agricultural or agri-food innovation ideas submit proposals when we launch a competitive process. To be considered, groups must:

- Be entirely Canadian and commit to keeping their technology in Canada (remember what the "C" in CAAIN stands for); and
- Include at least two small- or medium-sized enterprises (SMEs), which are defined as companies with no more than 499 employees and revenue not exceeding $50 million.

After all, one of our purposes is to stimulate economic growth.

Wait, there's more!

As our name suggests, CAAIN is a network. That means we go beyond simply funding worthy innovative agri-food research initiatives. Above all, we're a connector. If you're a player in the agricultural, agri-food, or high-tech sector, join us. If you're a post-secondary institution with a focus on agriculture or high technology, join us. If you're a venture capital operation looking to invest in Canada's future, join us. Membership in CAAIN has its privileges, including becoming part of a community that will help diversify and sustainably drive our nation's economy in the coming decades.

If what we're doing resonates, get in touch. Together, we can drive real progress in one of Canada's most important industries. ■

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Check us out online at **caain.ca**, LinkedIn, or drop us a line at **info@caain.ca**.

Cleanfarms Is Leading the Way in Sustainable Agriculture

Today's farmers are challenged by more than economy and weather — they're called on to produce more product yet still achieve sustainability goals.

Barry Friesen, P.Eng

Growing healthy food to feed Canadians and others around the world is a challenge in today's economic and environmental climate. Historically, a successful farmer had to be a jack of all trades, from predicting weather to managing farmhands and fixing high-tech equipment. On top of that, today's farmers must produce more product with a smaller carbon footprint while still being good stewards of their land.

Sustainability has become a farming best practice but some growers are finding that modern farming techniques can generate harder-to-manage ag-plastic waste. That's where Cleanfarms and its members come in.

Industry taking responsibility

Cleanfarms, a national non-profit industry stewardship organization, is committed to environmental responsibility through proper management of inorganic agricultural waste like used plastics. It has been developing and expanding programs to give farmers access to recycling or proper disposal of inorganic waste generated in farm operations since 2010. At present, 71 agriculture companies and related organizations take responsibility for their products and packaging at end of life through this ag-focused organization.

Cleanfarms' programs enable farmers to view farm operations through the lens of what can be recycled or managed for proper, environmentally-responsible disposal. Programs include:

- Nation-wide recycling of small plastic pesticide and fertilizer jugs;
- Nation-wide collection of larger one-way totes and drums;
- Nation-wide collection and proper disposal of unwanted pesticides and old, obsolete livestock and equine medications;
- Recycling of grain bags and twine in the Prairies; and
- Proper disposal of seed, pesticide, and fertilizer bags in Eastern Canada.

While these programs have posted significant achievements in managing farm waste materials, Cleanfarms' members are going even further in their mission to foster more sustainable farming in Canada.

Barry Friesen, P.Eng
Executive Director, Cleanfarms

Thinking circular packaging

The global movement toward a circular economy for packaging and non-durable products is driving new thinking in the agricultural industry about how to deliver products to farmers that optimize resource recovery and recycling and incorporate post-consumer recycled content.

One way to achieve an immediate impact is to shift some single-use packaging to reusable formats. Another is to incorporate post-consumer plastic resin from container recycling into new jugs for pesticides and fertilizer, which will drive stronger end markets. Canadian farmers are already finding greater convenience in having crop inputs delivered to them in reusable containers. Plus, Cleanfarms is working to support new Canadian end markets for ag-recyclables.

While it's early days for applications of packaging circularity to demonstrate large scale improvements in sustainability, Cleanfarms members are setting a course for robust change. ■

i To learn more about Cleanfarms and sustainable farming practices, visit **cleanfarms.ca**.

This article was **sponsored by Cleanfarms.**

Growing Opportunities with Natural Products Canada

Shelley King, MSc, MBA

Canada has a long-standing global reputation as an agricultural powerhouse. Recent advancements in technology and the growing demand for sustainable and healthy options have converged to create unprecedented opportunities for Canadian agriculture — and the world is taking note.

"We work with multinational corporations right around the globe," says Shelley King, CEO of Natural Products Canada (NPC). "It's our privilege to introduce them to Canadian companies and researchers who are developing the products and technologies they're looking for."

Not your grandparents' agriculture

From coast to coast to coast, entrepreneurs are contributing innovative products, technologies, and solutions across the broad spectrum of the agricultural industry — from everything that goes into growing and raising crops and animals to the plethora of value-added products that come out of the other side. From raising insects to converting crop waste into bioplastics, Canada's agricultural sector is more diverse and technologically advanced than ever.

A different approach to supporting innovation

NPC has the unique experience of working almost exclusively with innovators in and around the agriculture scene. Through a comprehensive and effective suite of programs, investment capital, advice, and networks, NPC supports Canadian startups, small- and medium-sized enterprises (SMEs), and research institutes in the critical stages of development and commercialization.

Addressing the "valley of death"

A unique aspect of NPC is its focus on the capital requirements of early-stage companies. Often referred to as "the valley of death," innovative businesses can face a financing gap between the public funds available for research and development and the private capital that's often reserved for companies with strong balance sheets. NPC's focus on helping companies become investment-ready, attracting investors to the opportunities, and actually investing in companies — 13 so far — has made a strong impact on the Canadian agricultural innovation scene.

It takes a village

NPC has also cultivated a cluster of investors, corporations, and industry experts — currently over 2,500 strong — all interested in Canada's innovation opportunities. With partners across the country and around the world, they're able to leverage the expertise, programs, capital, and industry intel that their clients and members need.

"The opportunity is huge," says King. "If we all work together, Canada will reap the rewards of this agricultural revolution for generations to come." ■

Shelley King MSc, MBA
CEO, Natural Products Canada

i Learn more at **naturalproductscanada.com**.

This article was **sponsored by Natural Products Canada.**

NPC NATURAL PRODUCTS CANADA

Canada's agricultural innovation is creating diverse products, including nutritious options for Canadians, sustainable protein ingredients for pets and production animals, and planet-friendly plastics made from food waste.

PHOTOS COURTESY OF NATURAL PRODUCTS CANADA

Enhancing Growth & Production

CanBiocin's unique, species-specific probiotics help production animals like poultry stay healthy, naturally.

NovoBind Livestock Therapeutics is developing natural solutions to protect livestock against pathogenic bacteria, viruses, and parasites without the use of antibiotics.

BioTEPP's natural bio-pesticides help fruit growers combat the pesky codling moth.

Oberland Agriscience converts organic waste into food for black soldier fly larvae, which are a nutritious protein ingredient for pets, poultry, and fish.

Creating Globally-Competitive Products

Bast Fibre Tech uses hemp to create biodegradable, compostable fibres for use in disposable wipes and other personal care products.

Chinova Bioworks' natural preservative, made from mushrooms, meets consumer demand for clean-label, natural ingredients.

Genecis Bioindustries diverts waste from food manufacturers to develop sustainable plastics.

Chickapea produces a protein-rich, nutrient-dense pasta made with chickpeas and lentils.

Hemp grown in fields is dried and processed by Bast Fibre Tech into disposable wipes.