

THE INNOVATION REPORT

2024-2025



vineland
RESEARCH & INNOVATION CENTRE

Message from the President & CEO

Since our incorporation, Vineland Research and Innovation Centre (Vineland) has supported the Canadian horticultural industry and government stakeholders in addressing innovation challenges by actively assisting and engaging them with focused and effective outcome-based research, development and commercialization support through our innovation strategy. This support is driven by Vineland's Mission to:

Improve the economic viability, sustainability and competitiveness of horticulture in Canada

A key pillar of this mission is the sustainability of horticulture. The modern use of the term "sustainability" was strongly influenced by the 1983 UN Commission on Environment and Development, also known as the Brundtland

Commission, where the term was defined as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs." The Brundtland Report also stated that the environment and development are inseparable when trying to achieve sustainability.

Over the last few years, Vineland has maintained a focused, but unwritten framework for sustainability within our support for the horticultural sector as well as our own internal operations. However, with the ever-changing external business environment, it was deemed timely in December 2022, that sustainability be codified in our business and operations and



Ian Potter, PhD, President & CEO

the Vineland Board of Directors approved the development and execution of Vineland's Environment, Social and Governance (ESG) Strategy and its associated operational framework. Through the lens of our ESG Strategy, Vineland manages and promotes:

- The support and services we offer and the projects we deliver.
- The management of the outcomes and impacts of our own operations to increase our positive reputation as a sustainability leader.
- Our commitment to setting leading standards of accountability that deliver optimal outcomes for all stakeholders.

At the outset of the strategy development, Vineland conducted an ESG material assessment to identify and assess relevant ESG factors for the organization. This was cross-referenced with Vineland's existing risk management framework in terms of impact and likelihood to assess the potential repercussion of each ESG factor. Based on the ranking from the risk process, Vineland categorized its ESG factors into three levels of materiality to be addressed over the next few years. This ensured that we were not immediately overwhelming our ability to deliver on our operations nor our ESG aspirations.

2023 was a foundation and baseline year for Vineland's operations under the ESG Strategy. We remain committed to advancing our strategic direction, building on past successes and addressing areas for improvement to create long-term value for Vineland, our employees and our stakeholders while contributing positively to society, the environment and the economy.

The 2024-25 Innovation Report's theme this year is "Sustainability" and it showcases Vineland's support to the industry and government stakeholders and the importance of innovation to drive sector sustainability (in all its facets).





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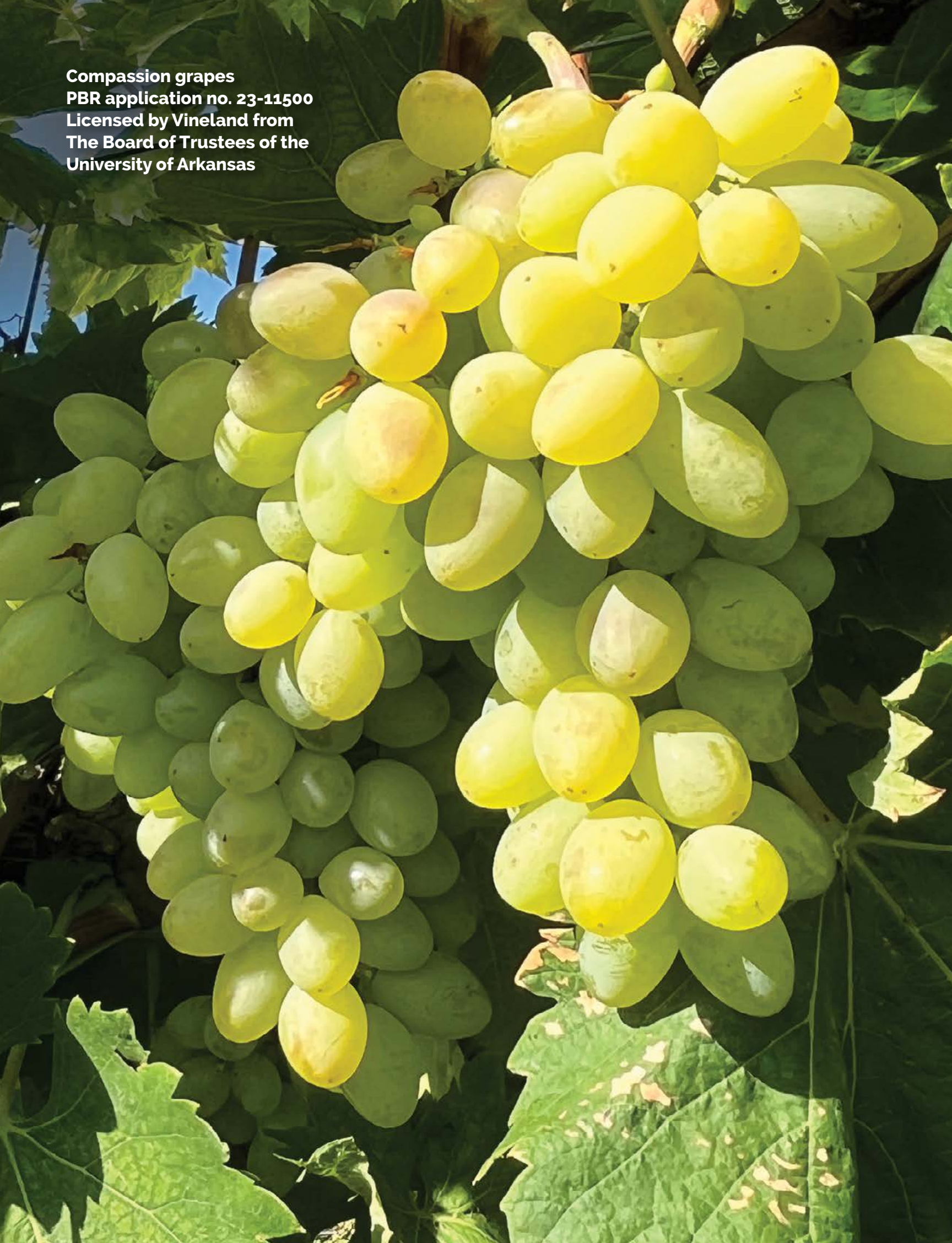
Diana Huson , MA, MBA

Director, Marketing & Communications



When you see this icon, click for
additional related content.

Compassion grapes
PBR application no. 23-11500
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Adapting crops to the changing Canadian climate

As in many other parts of the world, Canada is experiencing changing climatic conditions. Generally, spring is arriving earlier, summer is becoming hotter and plants, trees, and shrubs are facing increased stress from more intense flooding, droughts, a higher likelihood of frost, and new invasive pests and diseases.

"What we're seeing is not just a changing climate but also one that is more unpredictable. As a result, for example, we need later flowering fruit tree varieties to get past frost events but ones that are also more tolerant to hotter temperatures," says Travis Banks, Director, Crop Enhancement and Adaptation.

Over the last decade Vineland has worked towards that goal using two different approaches: developing its own climate-adapted varieties as well as scouting the world for varieties that could be adopted by growers here in Canada.

Vineland has a long-standing relationship and demonstrated experience in this area already with the tender fruit industry using both approaches. More recently, it's been a similar situation for table grapes, where the Vineland team has been bringing in table grape cultivars from three different breeding programs in the United States, particularly from northern regions which tend to produce more cold hardy varieties. Vineland's intent is to not only find well-performing varieties for the Niagara region but also those that could expand the market window for this crop in Ontario.

"We want to find plant varieties that are better adapted to our environment; for grapes, it's finding those that can survive an increasingly unpredictable Niagara winter and produce fruit that consumers want to buy," Banks says. "Other groups face the same challenges (that we do) so we build relationships with them and see if any of their material might work for us."

Vineland is also evaluating apple varieties in all five of Ontario's apple growing zones in addition to sites in Quebec and Nova Scotia. This could result in a variety that performs well everywhere or one or two that are particularly suited to certain regions, he notes.



Travis Banks, MSc, Director, Crop Enhancement and Adaptation

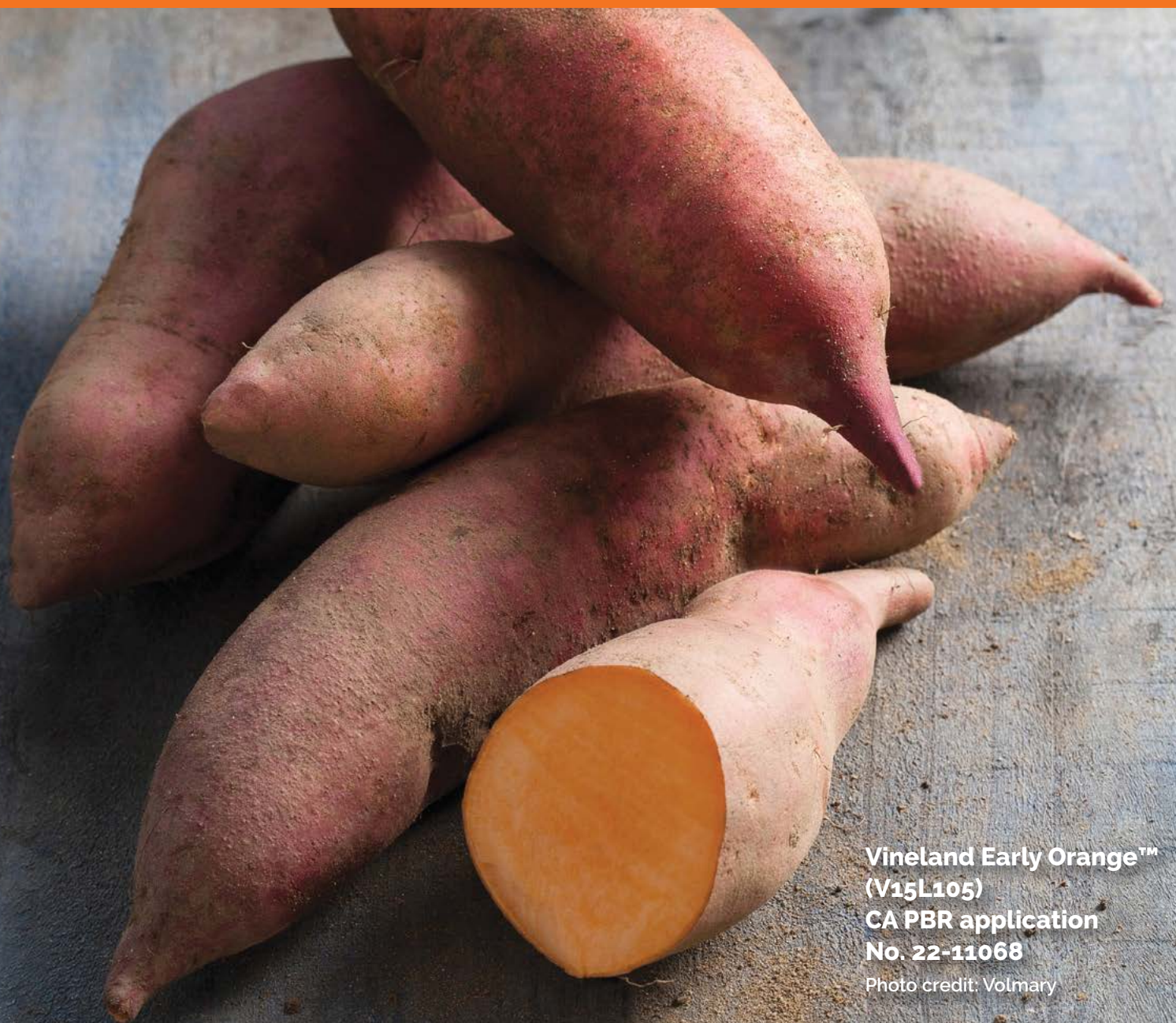
"Ultimately, what we're interested in with respect to climate hardy characteristics are later flowering varieties that can survive heat and those that use less water while still meeting consumer sensory preferences," he adds. "Climate change isn't just about the weather, though - it's also about the changing disease and pest pressures. Newly emerging diseases negatively impacting plant health and milder winters aren't killing pest populations off the way they used to."

The search for climate-adapted varieties is a time-consuming process, however. This means that although this work has been ongoing at Vineland for some time, the first climate-adapted and consumer preferred apple variety isn't expected to become available for growers to plant until 2028 and then it will still take several years for the trees to start producing. New tender fruit and grape varieties face similar timelines.

In every instance, Vineland acts as a variety evaluator, intellectual property manager and commercialization agent, filling this key role for the industry. It's not easy to bring new varieties into Canada and it's hard for individual growers to make the needed investments into researching and evaluating the performance of new varieties.

“We can help others execute their IP strategies in Canada while giving Canadian growers access to the latest international varieties that have been proven to both grow well here at home and meet consumer demands.”

— Travis Banks, Director, Crop Enhancement and Adaptation



**Vineland Early Orange™
(V15L105)
CA PBR application
No. 22-11068**

Photo credit: Volmary

That's why nine of 15 sector groups representing more than 150 different fruit and vegetable crops identified variety acquisition and/or access to new varieties and germplasm as a top priority in the 2023 Ontario Horticulture Research Priority Report.

Through its international networking and scouting activities, Vineland builds connections with breeding programs around the world and is also able to bring new varieties to Canada by becoming the Canadian licence holder and then sub-licensing production to nurseries and growers.

"We act as a trusted manager for market access and can work through the logistics of variety protection, which is particularly challenging and important for companies who have not worked in Canada before," Banks says.

These connections are also beneficial in locating international markets for Canadian-bred varieties, such as Vineland's five new sweet potato lines that have all been successfully licensed to a German company for the European market.

"As a result of Vineland's material becoming commercially available, we are able to develop new and expanded markets for our products," ends Banks.



Intellectual property (IP) spotlight

Vineland's scouting strategy, its Canadian experience and international networking approach let it act as a domestic agent for companies wanting to enter the Canadian market. This means:

- Managing plant breeders' rights while bringing in new varieties on behalf of the industry
- Handling clearance through quarantine processes
- Establishing trials in regions across Canada as needed
- Leading sub-licensing activities

Benefits of new varieties

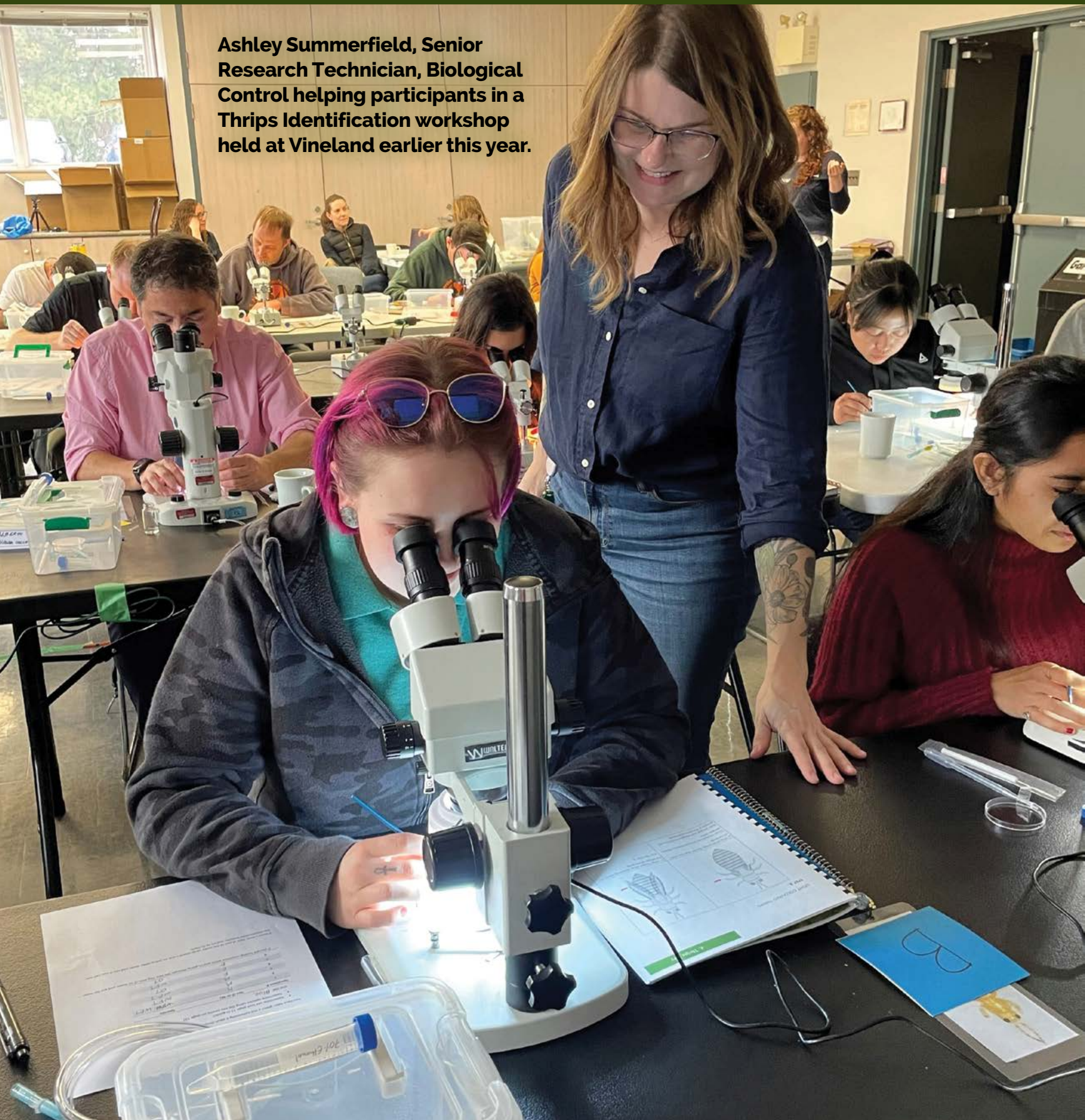
- ✓ Extending the market window:
 - Three to four weeks earlier and later for peaches
 - Three to four weeks longer for table grapes
- ✓ Replacing imports:
 - Table grapes are the #2 imported product by value as table grape production is limited to the Niagara region
- ✓ Higher value crop opportunities:
 - Replanting older apple and pear varieties with newer, higher value options or switching to new table grape varieties from other crops
- ✓ Enabling local production:
 - Reduces greenhouse gas emissions from long distance transportation
 - Creates stability in the local food system



Putting knowledge into practice for better pest control

How effective knowledge mobilization has transformed pest management in the greenhouse sector

Ashley Summerfield, Senior Research Technician, Biological Control helping participants in a Thrips Identification workshop held at Vineland earlier this year.





Onion thrips
(Thrips tabaci)



Western flower thrips
(Frankliniella occidentalis)



Pepper thrips
(Thrips parvispinus)

There's no denying the power of collaboration — and often, a connector is needed to be the catalyst for bringing people and organizations together. That's particularly true in a field with many stakeholders such as pest control.

Vineland has always prided itself in connecting people with best practices in horticulture and now there are new statistics generated by Vineland on knowledge mobilization that has highlighted the significant impact the team has made in improving pest control across the greenhouse sector. In particular, between 2014 and 2022, the adoption rate of Integrated Pest Management (IPM) practices by Canadian ornamental growers increased from 69 per cent to 94 per cent. During the same time, IPM has become the industry standard for pest control and management in the Canadian greenhouse sector.

"At Vineland, we conduct a wide variety of research, development and demonstration work but if we don't communicate the results of this work to the end users, then our efforts and resources have been wasted. By collaborating, we are able to mobilize each other's networks and contacts, allowing us to work together and disseminate our information more broadly," says Rose Buitenhuis, PhD, Director, Biological Crop Protection. "Together we are stronger and we can do more. If you put the whole industry on a continuum; Vineland collaborates both upstream and downstream so we can maximize the impact of our research findings, which helps bring people together to provide solution-orientated knowledge to the sector."

The relationship with Ontario Ministry of Agriculture, Food and Agribusiness (OMAFRA) IPM Specialists Sarah Jandricic, PhD (greenhouse floriculture) and Cara McCreary (greenhouse vegetables) is particularly invaluable, adds Buitenhuis, because of their ongoing work in knowledge mobilization

and their own strong networks. As well, building on Vineland's networks and the OMAFA's relationships with growers means Vineland is aware of wider concerns and issues in need of solutions.

"Not everyone learns the same way or looks for information in the same places, so we implement a variety of tools, including videos, presentations at events, writing articles and running workshops, to name just a few, in order to more effectively share information," Buitenhuis says.

An innovative recent example is a thrips identification workshop she helped run for vegetable and ornamental growers together with OMAFA and Agriculture and Agri-Food Canada. The most recent thrips research had identified that there are multiple problematic thrips species and Buitenhuis knew that in order to take proper action, growers would need to know how to differentiate them from each other.

With the help of a grant from the Ontario Agri-Food Innovation Alliance, she was able to purchase enough microscopes to host several hands-on grower workshops — one at Vineland and two in Leamington — where participants learned tips, tricks and how-to for identifying the different thrips species.

It's this kind of innovative approach to knowledge mobilization, combined with a focus on collaboration and the desire to help the industry that contributed to Buitenhuis winning an Excellence in Agriculture Award in Agri-Food Education from OMAFA last year.

This Vineland focus on collaboration and knowledge mobilization has also supported the discovery and development of new biocontrols, methods and tools for green and sustainable pest control and disease management, as well as new resource materials for growers to help train the next generation of IPM specialists.



Rose Buitenhuis, PhD, Director, Biological Crop Protection



“Rose has been an invaluable partner to the American Floral Endowment (AFE), consistently demonstrating her commitment to advancing the industry through the practical application of her research. Her dedication to improving pest management practices is evident in the many outstanding presentations and educational sessions she has conducted with AFE, including impactful educational sessions for growers in Colombia, informative fact sheets on thrips management and biocontrol, presentations at industry events such as Cultivate and her expert webinars — both for our Grow Pro Webinar Series and our Thrips and Botrytis campaign. Her recent Grow Pro webinar, “Integrated Control of Thrips,” broke all of our records for registrations and attendance, which is a testament to her reputation in the industry and the exceptional quality of her work.”

**— Laura Barth, Research Coordinator,
American Floral Endowment**

Vineland’s knowledge mobilization efforts around biocontrols aren’t just limited to Canada. In fact, over the past 14 years, these efforts have spread around the world into

12 countries across four continents, and have included more than

185 presentations, plus

85 publications, guest lectures at four universities and colleges, and biocontrol crop protection workshops for more than

300 participants.

“The new biocontrols we helped commercialize are generalist predators which eat a lot of pests, not just thrips,” Buitenhuis explains. “We concentrated on creating a whole biocontrol system. Pest control isn’t a one product job; everything has to work together.”

“Together with our collaborators, we are empowering growers by enhancing their understanding and use of IPM through a variety of knowledge mobilization tools, which in turn will help the industry be greener, more sustainable and hopefully also more productive and profitable,” Buitenhuis adds.



Breaking new ground on soils, carbon and sustainable orchards

As climatic conditions continue to evolve, farmers must adapt the crops they grow and how they grow them, as well as look for sustainability approaches that encourage and lead to meaningful carbon sequestration.

The challenge: there is very little data or practical information on how to improve carbon storage in the soil, particularly for horticultural crops such as orchards.

The response: exciting and breakthrough research involving Vineland's Plant Responses and the Environment team to create data-driven links between soil carbon storage and sustainable orchard management.

"There is a lack of understanding of how different production practices can impact carbon storage in soils. A lot of the carbon historically stored in the environment is in the soil and some of it is locked away or is mineralized organic matter," says Rhoda deJonge, PhD, Director, Plant Responses and the Environment. "Depending on tilling practices and the incorporation of new organic materials, soil texture and compaction, that carbon can either be released from the soil or it can be built."





"Nobody has looked at this closely for Ontario orchard growers and we want to see how their existing on-farm practices impact carbon storage," she adds. "With this work, we are not just filling a critical knowledge gap, but more importantly, we are filling a gap for on-farm implementation of practices by farmers."



**Rhoda deJonge, PhD,
Director, Plant Responses
and the Environment**

In a three-year project with the Ontario Tender Fruit Producers Marketing Board and Ontario Apple Growers, announced in May by Vance Badawey, Parliamentary Secretary to the Minister of Transport and Member of Parliament for Niagara Centre, on behalf of the Honourable Lawrence MacAulay, Minister of Agriculture and Agri-Food Canada, the Vineland team is working with Ontario Ministry of Agriculture, Food & Agribusiness tree fruit specialists to collect and analyze soil samples, as well as surveying growers about their production practices.

Matthew Coker, Technical Assistant, Research & Development.



Ontario apple orchards are a mix of older, traditional and new high-density plantings. However, there is a shift beginning to happen in tender fruit growing as well.

A key question is how this shift in production practices is impacting soil health and carbon sequestration. Another goal is to understand how typical spraying, mulching and pruning practices also impact soil carbon sequestration.

“At Vineland, we understand soils in a way that so many others don’t or can’t and pair that with our expertise in horticultural production practices, makes us an ideal agent to find the answers to these important questions,” she says.

A particularly valuable asset is Vineland’s soil laboratory and its capacity to look at more than just the chemical and nutritional components of soil, such as physical, hydrological and biological aspects.

Looking at all characteristics of soil health can pinpoint what is challenging the soil and help build specific recommendations for growers based on what’s needed.

“When you have a long-life crop like a tree, you must look at more than just nutrients. A tree needs to have



Did you know...

Vineland is now part of Ontario’s Soil Action Group, a collaboration comprised of government, industry stakeholders, conservation organizations and academic institutions to provide guidance and recommendations for implementing Ontario’s Agricultural Soil Health and Conservation Strategy.

“To understand carbon storage in the soil and how the dynamics of that relate to different planting practices, we need more information beyond orchards and being part of the Soil Action Group helps us get these broader perspectives.”

— Rhoda deJonge, PhD, Director,
Plant Responses and the Environment



a stable foundation to grow for a decade or more and our soil laboratory allows us to test all aspects of soil health and how they interact with each other," deJonge says. "With a holistic view of the soil, you could improve the soil biota to get more long-term benefits from the soil and reduce fertilizer use, for example."

The potential impact of this work could be significant. There are approximately 9,000 acres of tender fruit orchards in Ontario with a farm gate value in 2023 of more than \$85 million and more than 15,000 acres of apple orchards with an average annual farm gate value estimated at \$118 million over the last five years. The information gathered through this research will help the industry understand the impacts of its current practices as well as develop tools for future sustainability.

"Tree fruit growers have long been adopting sustainable farming practices to improve soil health and use water, fertilizer and crop science tools more efficiently to produce healthy food for our consumers," says tree fruit grower Brian Rideout, chair of Ontario Apple Growers. "We know there are research and information gaps for growers in the area of carbon sequestration and sustainability, and filling those gaps will help determine next steps."

While Vineland's soil baseline work has just begun, it is part of a larger Life Cycle Analysis project for Ontario peach and apple orchards launched in 2024. This project also involves evaluating new peach varieties for climate resilience — work that is also taking place at Vineland. All of this work is funded in part by the governments of Canada and Ontario through the AgriScience Program under the Sustainable Canadian Agricultural Partnership, a five-year, \$3.5 billion investment by federal, provincial and territorial governments to strengthen competitiveness, innovation and resiliency of Canada's agriculture, agri-food and agri-based products sector.



Opened in 2023, Vineland's newly restored Jordan Building is a dynamic hub for the Plant Responses and the Environment team, featuring office and cutting-edge laboratory spaces. This upgraded facility has significantly enhanced Vineland's research capabilities, including two state-of-the-art laboratories focused entirely on soil and substrate analysis. Over the past year this space has advanced optimal substrate blends for indoor strawberry production, assessed the impact of orchard practices on soil health and carbon storage, and investigated the effective use of various organic waste products in soils and substrates. Further work on the use of biostimulants to reduce synthetic fertilizer is underway in addition to determining the best use for vegetable and soil wastes from vegetable cleaning processes. These initiatives highlight Vineland's pivotal work in supporting the horticultural industry, small- to medium-sized businesses and government to develop solutions, foster innovation and advance commercialization.



Creating impact for growers with horticultural technological solutions

Technology and innovation are firmly part of the past and will be an even more important pathway for the future of the horticultural sector. For many companies, starting this journey can be challenging and figuring out where to begin is often a struggle. This applies to start-ups as well as established companies with an innovation they hope to bring to market.

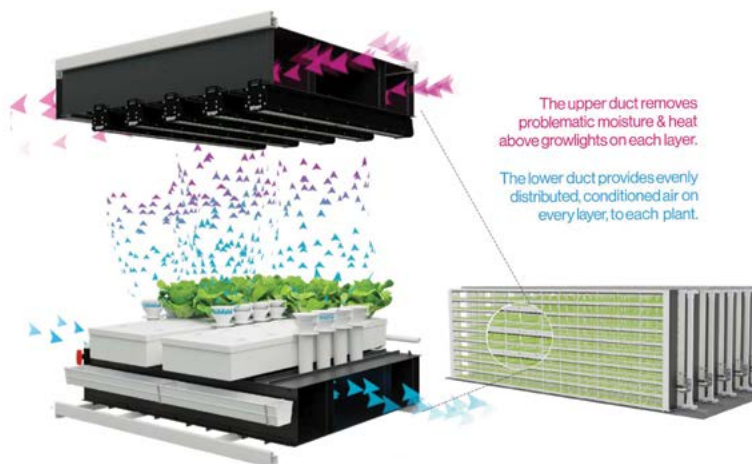
This is where Vineland's Horticultural Technology Solutions team has been making an impact over the last few years, filling the technological gap, acting as a solutions expeditor to companies by helping to reduce the risk associated with introducing their technologies to the market. As an innovation service provider, Vineland supports companies by improving their path to market for new products with our technological expertise in prototyping, rapid testing and product trials.

"The future of horticultural technology is all about robotics, computer vision, data science, machine learning, artificial intelligence, systems integration and more. We can bring any of this expertise to clients and help them solve their unique challenges within the horticultural space," explains Brian Lynch, PhD, Director, Horticultural Technology Solutions.



Brian Lynch, PhD, Director,
Horticultural Technology Solutions

The AMPL Platform™



The upper duct removes problematic moisture & heat above growlights on each layer.

The lower duct provides evenly distributed, conditioned air on every layer, to each plant.


AMPL Plant Factory Shown

Push/Pull Ascending Airflow has multiple applications.

The AMPL Cradle

Automated Plant Handling,
Analysis, and Robotics Platform





“We’re pushing boundaries and offering competitive innovation services using cutting-edge technology for our clients — solving problems in a practical way that is useful and applicable to the end-users of technologies in horticulture for maximum impact,” he adds.


The team’s core service pillars are comprised of technology development, improvement, integration, validation and adoption and can provide support at every step along the innovation value chain. This has included projects such as technology roadmaps, designing and path planning for robots and artificial intelligence-enabled solutions for pest and disease detection. All of this expertise is well aligned to address the complex challenges facing growers and technology companies looking to create technological solutions for the future of food production.

Technological solutions focused on the future of food production aim to reduce labour, optimize inputs and let growers identify — and treat — problems virtually almost before they occur. It is no surprise that indoor agriculture and controlled environment farming are growing in popularity as growers and food businesses are looking for reliable, nutritious food sources that aren’t affected by weather extremes and changing climate patterns.

This expertise was recently put to the test in a project with AgricUltra™ Advancements, supported in part by the Greenhouse Technology Network, and funded by the Government of Canada through the Federal Economic Development Agency for Southern Ontario (**FedDev Ontario**).

AgricUltra™ Advancements has developed an industry leading turn-key scalable grow-platform for vertical farming: AMPL is a self-contained system controlling every aspect of production from water and nutrients to heat, humidity and run-off, with an emphasis on hyper-precise control of airflow through





the grow bed and plant canopy. AMPL's precision control allows for elevated environmental setpoints and mitigates disease pressure while facilitating a patented Energy-Harvesting option that captures and uses the waste heat of the grow lights to reduce the HVAC systems electrical consumption. Vineland has been validating AgricUltra's AMPL System™, for the indoor production of horticultural crops.

From feasibility studies of new technological improvements to the platform, all the way to validating the efficacy of the system for production of strawberries and long-cane raspberries, Vineland's expertise has supported the product development of this new system for horticultural applications. In the

final leg of this multi-year, multi-phased project with AgricUltra™ Advancements, a full AMPL System™, is set up for validation at Vineland for controlled testing by Vineland researchers.

After developing a prototype automated charge and discharge platform "The Cradle" for AgricUltra's AMPL System™, this year Vineland's Horticultural Technology Solutions team is conducting an on-site validation study of the whole AMPL system. The main focus of the study is on energy efficiency — closely monitoring temperature, humidity and fluid flow to precisely trace energy use, recovery and conversion. Vineland's multi-disciplinary team will also provide a technical review and a production evaluation.



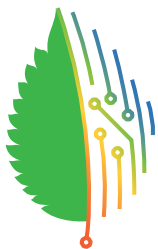
“Vineland’s campus has provided a sandbox for us to not only evaluate our technology at-scale but provides us with the opportunity to work closely with Vineland’s team to optimize our product and gain important insights for improvement in real-time,” says Emil Breza, President and Co-founder of AgricUltra™ Advancements.

The project with AgricUltra™ Advancements is a great example of how Vineland’s breadth of expertise can accelerate a client’s path to market while overcoming unexpected hurdles. “This is the type of multi-disciplinary approach we can bring to the table — horticultural technology expertise coupled with a deep understanding of plant production, engineering and technological solutions that allows us to validate and improve technologies that are at or close to commercialization,” says Dan Bath, PhD, Research Scientist, Horticultural Automation.

“Vineland is concentrating on providing and supporting impactful solutions and we look at everything through a lens of how to make it work. At the end of the day, solutions such as controlled environmental agricultural solutions need to be practical and economically feasible in order to successfully address food security issues and pave a pathway to the market,” Lynch adds.



Dan Bath, PhD, Research Scientist, Horticultural Automation



Greenhouse Technology Network

Vineland is a member of the Greenhouse Technology Network (GTN), collaborating with small- and medium-sized organizations to advance the development, adoption and implementation of technologies to support the greenhouse industry.

Expanding our capabilities

Vineland's new Advanced Pathology Laboratory is a specialized facility that contains a molecular laboratory and six controlled environment rooms designed for plant trials. Strict biosecurity protocols allow our team to work safely with pathogens that pose a high risk to the sector. This new facility, funded in part by Agricultural Research and Innovation Ontario (ARIO), will expand our capabilities to work directly with industry to evaluate the efficacy of disinfectants, (bio)pesticides, fungicides or other control mechanisms and develop/evaluate new horticultural crop varieties for resistance to even the most challenging pathogens.



Andrew C. Wylie, PhD, Research Scientist, Plant Pathology conducts plant pathology research in the new Advanced Pathology Laboratory.



Advancing sustainable waste opportunities



One of Vineland's strategic innovation goals is to improve the connectivity of products and processes across the food chain. Reduction in food waste is an area that lends itself well to enhancing connections across the value and supply chain since it poses a challenge for the horticultural industry but also offers opportunities to bring economic and environmental benefits.

Adding value to waste streams

One of Vineland's newest projects is working with the Canadian Institute of Food Science and Technology to look at waste as a sustainability practice that can lead to new value-added products. The project is part of the new Food Sustainability and Resilience Cluster, funded in part by the governments of Canada and Ontario under the Sustainable Canadian Agricultural Partnership, a five-year, \$3.5 billion investment by federal, provincial and territorial governments to strengthen competitiveness, innovation and resiliency of Canada's agriculture, agrifood and agribased products sector.

"This project builds on work we've previously undertaken for the apple industry to identify the sources of its waste streams and recommend potential new product opportunities from those waste streams, such as apple pomace," explains Alexandra Grygorczyk, PhD, Research Scientist, Sensory and Consumer Services.

Alexandra Grygorczyk, PhD, Research Scientist, Sensory and Consumer Services and Mithun Shrivastava, MSc, MBA, Consumer and Market Researcher



**Amy Bowen, PhD, Director,
Consumer, Sensory and
Market Insights**

Under the scope of the project the Vineland team will explore alternatives to landfilling fruit and vegetable processing waste to create value-added by-products. For example, Nortera Foods, a major food processor that supplies most of Canada's frozen vegetables is looking for more sustainable ways to deal with the juice left over from pressing cobs and husks following frozen corn production.

Currently, corn cobs are pressed to expel the juices and then sold as animal feed, but the remaining liquid is a challenge as it is too difficult for conventional wastewater management processes to handle and results in it being trucked away for land irrigation.

"We're working with Nortera Foods to identify new value-added opportunities for that juice by building industry connections and undergoing a market analysis to determine what makes sense strategically," she adds.

For another project activity, Vineland is working in collaboration with Gum Products International (GPI) to determine whether onion processing by-products could be used as clean label antimicrobials. Vineland has connected GPI with an onion by-products production facility and will be completing sensory testing of the onion-based ingredients while GPI tackles the microbial challenge tests.

"This is work that really showcases Vineland's ability to leverage our network and create new opportunities. We understand the needs of the market, our collaborators and how to help them find solutions to their challenges through research or optimizing new processes and technologies," adds Amy Bowen, PhD, Vineland's Director of Consumer, Sensory and Market Insights.

Understanding sustainability in horticulture

Vineland's team is also uniquely qualified to help the industry establish sustainability baselines and has completed an in-depth report of this nature over this past year for the Ontario Fruit & Vegetable Growers' Association.

Vineland's work showed that over the last two decades, Ontario's fruit and vegetable growers have been widely adopting a range of practices that support sustainable local food production. This includes investments in technologies and practices for more efficient use of water, energy and fertilizer; the use of tools like soil testing and cover cropping; and increasing the use of non-chemical methods of controlling pests and diseases.

"What we learned from this work is that growers genuinely want to be sustainable and are voluntarily adopting business-based practices

that will let them do so," says Grygorczyk. "A report of this nature can play a critical role in helping a sector benchmark its sustainability activities."

This type of work is part of Vineland's ongoing efforts to provide innovation services and support to clients in the horticultural sector and includes preparing life cycle assessments and roadmaps for adopting sustainable technologies, for example. Over the last year, Vineland has also invested in increasing their skills and expertise in sustainability across its horticultural focus areas. This allows Vineland to view and investigate in depth, sustainability from different perspectives, such as the environmental, social and economic impacts, but also via making greenhouse gas emissions estimations.

"We work in a lot of different spaces to support the sector as they work to understand what sustainability means to them," Bowen notes, adding that since Vineland is embedded in the industry, the team has a good understanding of what is happening from a sustainability perspective and how this connects across the food chain.

This work further supports Vineland's Consumer, Sensory and Market Insights team in ground-truthing sustainability options for companies. This means working closely with Vineland's production team to evaluate the production, economic and environmental feasibility of existing applications and technologies.



Adding food grade laboratory facilities

One of Vineland's latest infrastructure additions is a food grade laboratory which will provide an expanded workspace and fill a specific need around fruit and vegetable waste upcycling with new capacity to process by-products on-site.

"For this type of work, we often need a variety of drying and milling capabilities but at a small scale for research purposes, which can be hard to access," Grygorczyk says.

"The space will also complement the work of our sensory panel, providing a larger space and new equipment for preparing samples for sensory evaluation and consumer testing," adds Bowen.



Apple pomace on a sheet pan



Alexandra Grygorczyk and Zhansaya Ingkarberk, Research Technician, Consumer Insights preparing new equipment for operation. Pictured: Ultracentrifugal mill and vacuum oven.



Advancing organizational excellence through ESG Reflection and Improvement

In 2024, Vineland finalized its first ever ESG (Environmental, Social and Governance) Framework report, embedding ESG facets and principles into the fabric of our business practices. This new framework aims to adopt both financial and non-financial considerations to help Vineland's sustainability practices.

In pulling together our inaugural report, historical, current and future looking data collection and analysis played a critical role in serving to help define key performance indicators but also help assess material risks.

With plans to build a robust set of organizational priorities, our report focused on a number of initial priorities including Workplace Safety; Employee Health and Mental Health Care; Energy Management; Water Use Management; Vineland Waste to Landfill; Human Capital Development; Employee Retention; Client Relations and Equity, Diversification and Inclusion.

While successes were evident in a number of priority areas such as workplace safety, energy management, waste reduction and client relations, there are areas requiring further enhancement including a continued focus on employee health;

equity, diversity and inclusion (EDI) and fiscal sustainability. Key areas for enhancing our operations in 2024 are:

- Continuously promoting workplace safety measures and learning from near-misses.
- Further implementing initiatives to support employee health and wellness and promote overall well-being.
- Advancing options for sustainable water management practices.
- Enhancing waste reduction strategies to minimize landfill impact.
- Strengthening human capital development programs to ensure continuous learning and career advancement opportunities.
- Developing comprehensive metrics to measure/ manage progress in equity, diversity and inclusion initiatives.

This past year has been a foundational and baseline year for Vineland. We remain committed to advancing our ESG Framework, building on past successes and addressing areas for improvement to create long-term value for Vineland, its employees and stakeholders while contributing positively to society, the environment and the economy.



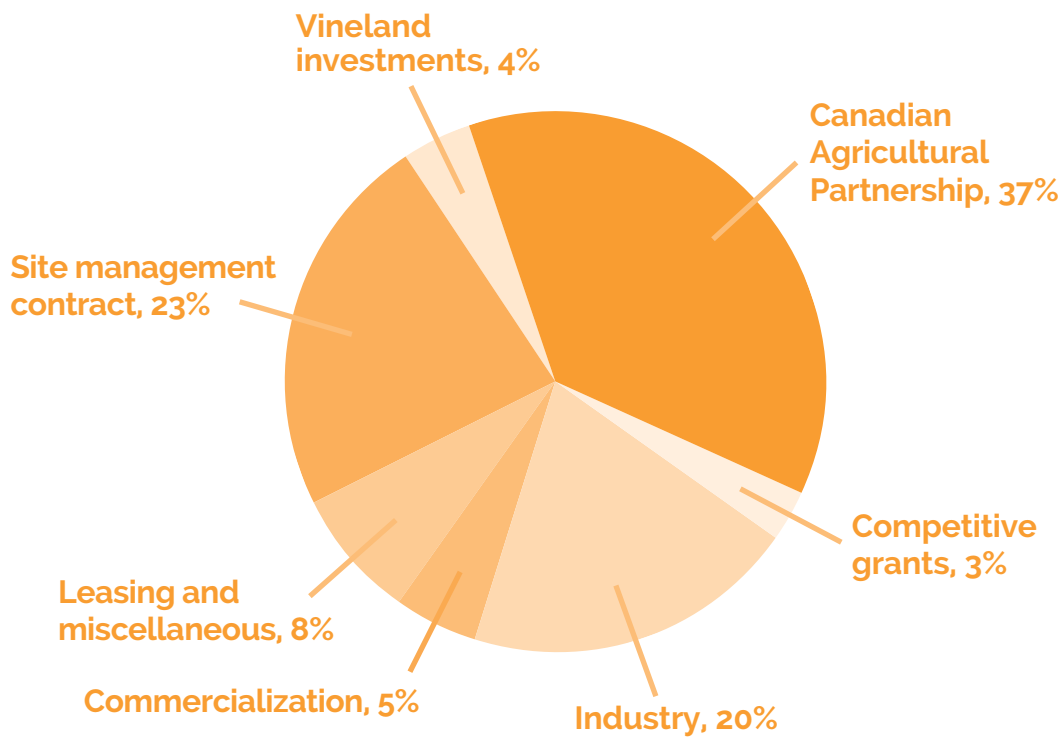


Examples of action taken in 2023 were:

- 1. Energy management:** Vineland set benchmarks for greenhouse gas emissions, scrutinizing our natural gas and hydro usage. Plans (and budgets) were set in motion to further enhance energy efficiency and sustainability.
- 2. Water consumption:** Over the past five years, Vineland has achieved a gradual decrease in overall water usage. This reduction was attributed to improved leak detection and maintenance practices, reflecting a deep-seated commitment to responsible water management.
- 3. Waste reduction:** Vineland consistently reduced its landfill footprint year after year, showcasing effective waste management practices and a steadfast dedication to environmental stewardship.

Vineland at a glance

Revenue April 1, 2023 – March 31, 2024



Annual budget
\$12.7 million

Partnerships



273 partners*

244 industry **9** academic

20 government

From

9 Canadian provinces

(Alberta, British Columbia, Manitoba, New Brunswick, Nova Scotia, Ontario, Prince Edward Island, Québec and Saskatchewan)

17 countries (Australia, Belgium, Canada, England, Finland, France, Germany, India, Israel, Malaysia, New Zealand, Norway, Spain, Switzerland, The Netherlands, United Kingdom, United States)

*For fiscal year 2023-2024

Commercialization

- 5** Vineland developed technologies with patents issued/filed
- 39** plant varieties with Plant Variety Protection issued/filed
- 14** trademarks registered/filed
- 85** per cent of Vineland's protected IP is commercialized or under further collaborative R&D with business partners

Research capacity and performance*

15 research scientists

\$161,000 research intensity
(research revenue generated per researcher)*

\$33,000 innovation strength
(royalties generated per researcher)*

54% proposal success rate*

*For fiscal year 2023-24

Governments investing in horticultural research and innovation

The governments of Canada and Ontario are investing up to \$23.55 million through the Sustainable Canadian Agricultural Partnership (Sustainable CAP) in horticultural research, innovation and commercialization activities, and research infrastructure, all to benefit Ontario farmers and consumers.

This multi-year investment will support the Vineland Research and Innovation Centre in research activities to increase the competitiveness and profitability of horticulture in Ontario and Canada. It will also support the Centre's work with Agricultural Research and Innovation Ontario (ARIO) in ensuring there is up-to-date equipment and infrastructure in place to conduct industry focussed research and innovation activities.

"The Vineland Research and Innovation Centre is a key part of Ontario's wider agri-food research capabilities that drive innovation and commercialization for the industry," said Rob Flack, Minister of Agriculture, Food and Agribusiness.

— Excerpt from *Agriculture, Food and Agribusiness press release, July 11, 2024.*



Pictured above from left to right: Ian Potter, PhD, Vineland President and CEO, Rob Flack, Minister, Ontario Ministry Agriculture, Food & Agribusiness, May Chang, Vineland Board Chair, Darby McGrath, PhD, Vineland Vice-President, Research & Development, Dr. Lorne Hepworth, Chair, Agricultural Research and Innovation Ontario, Sam Oosterhoff, MPP Niagara West and Associate Minister of Energy-Intensive Industries.



May Chang, Board Chair

Vineland's Board of Directors (2024-25)

- May Chang, Board Chair
- Tony DiGiovanni, Board Vice Chair
- Kristin Ego MacPhail
- John Groenewegen, PhD
- Lori Hall
- Derek Lothian
- Rick Mastronardi
- Mark Picone
- Ian Potter, PhD, Vineland President and CEO
- Glen Price
- Liz Stokes Bajcar
- Angela Zangari

Job creation, education and training*

81 full-time staff

51 highly qualified positions

1 PhD student

*For fiscal year 2023-24

Vineland Research and Innovation Centre is a uniquely Canadian results-oriented organization dedicated to horticulture science and innovation. We deliver innovative products, solutions and services through an integrated and collaborative cross-country network to advance Canada's research and commercialization agenda.

Vineland is situated on treaty lands. These lands are steeped in the rich history of the First Nations including the Hatiwendaronk, the Haudenosaunee, the Anishinaabe and the Mississaugas of the Credit First Nation. Many First Nations, Métis and Inuit people from across Turtle Island live and work in Niagara today. Vineland stands with all Indigenous people, past and present, in promoting the wise stewardship of the lands on which we live.

We are an independent, not-for-profit organization, funded in part by the Sustainable Canadian Agricultural Partnership (Sustainable CAP), a five-year, federal-provincial-territorial initiative.

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