THE INNOVATION REPORT

2020-2021

vineland
RESEARCH & INNOVATION CENTRE

Inclusive success across horticulture

Ian Potter, President & CEO

As I write this article, COVID-19 continues to dominate much of our nation's thinking and planning. Vineland has weathered the pandemic well and we are continuing to adapt to this ever-changing normal — a testament to our employees and their dedication to Vineland and our clients.

As we continue to support the sector with critical research and innovation, we also need more than ever to remain focused on the longer term needs of tomorrow and into the future.

With a new strategic plan, a refocused innovation strategy and support from the provincial and federal governments, along with our many stakeholders, we are well positioned to maintain and grow this support to the sector.

Even before the pandemic, it was evident the social, economic and environmental worlds were increasingly interconnected. As a result of COVID-19, our world today faces a heightened awareness for food security and an effective food supply chain. This presents more challenges and opportunities when the speed of change is more rapid and the pace of that change, almost instantaneous.

The implications for Vineland and the broader horticulture and agriculture sectors are profound and the need to think, learn, synthesize and act in a whole system manner has become more of an imperative. It is incumbent upon Vineland, as part of our normal business activities, to have the capacity to develop a whole system understanding to identify core issues and frame them in ways that enable effective action.

That capacity must include the ability to not just work across the horticulture sector, but also across other industries to bring together a network of outstanding thinkers and interconnect technologies and disciplines to help horticulture respond to opportunities and challenges it will face in the years ahead.

As a result, a significant part of our corporate and innovation planning is the constant need for broad-based current and future horticulture market intelligence to inform the direction and activities of our innovation programs.

Research and innovation are long-term commitments and we need to ensure that Vineland has effective program management principles embedded for effective short and long-term decision-making.

We have to be nimble enough to quickly respond to different external needs, rigorous with stopping or pausing an area when there's insufficient impact and cognisant of the need to execute a portfolio of short to long-term projects. We also have to resource the work effectively and enable a sustainable future for both Vineland and the broader horticulture sector that we serve.

Getting good business intelligence and advice is a fundamental building block for any organization. In Vineland's case, our founders had this in mind when they set up the governance support functions, and as a result, we are pleased to have two advisory councils to provide support to Vineland's Board of Directors: the Innovation Advisory Council and the Stakeholder Advisory Council. These councils include national and international members providing advice and guidance from different areas of expertise than our board members.

Being successful at innovation requires good and candid advice. This report is only possible due to our engagement with our stakeholders and the advice we receive from our many volunteers on the Vineland advisory councils and beyond. My sincere thanks and appreciation is extended to all.

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Making an impact through strategic innovation

The heart and soul of Vineland is innovation. And as an independent, not-for-profit organization, Vineland's success relies heavily on real and tangible impacts it is able to create for its clients and for the horticulture industry that it serves.

Tania Humphrey, Vice President, Research and Development

This past year, Vineland updated its innovation strategy. This was driven by a general need to take stock of the organization 12 years after its founding — what has been accomplished and where the organization could and should go in the future.

The agricultural innovation space is a busy one with many different organizations and institutions looking to carve out their own niches. Vineland's particular specialty is horticulture, a sector that's incredibly diverse with more than 150 fruit and vegetable and a plethora of ornamental crops.

"Each crop has its own opportunities and potential and part of our strength lies in knowing where the greatest needs are and where we can create the most commercial impact to benefit the greatest number of farms and businesses in the sector," says Tania Humphrey, PhD, Vineland's Vice President of Research and Development.

That's what led Vineland to narrow its innovation focus to just three key areas in its new strategy: plant products, automation and environment. These are areas it believes, regardless of the crop, will generate success and support the Vineland mission of driving profitability, competitiveness and sustainability for growers and the broader horticulture sector.

"If you want to create impact, you have to make sure your resources are directed to what will make the most impact and that they aren't spread too thin," she adds. "We needed to make some bold calls in key areas and clearly define what we're going to do."

Since then, the COVID-19 pandemic has dramatically and almost instantly changed the world and brought to the forefront cracks in food and farming systems in Canada and around the world that can no longer be ignored. What does that mean for Vineland's innovation strategy and its path forward?

Challenges around horticulture's mobile, seasonal workforce has highlighted the need for more automation in the sector and although Vineland has been working on these types of solutions for several years, the need for practical, implementable solutions has become more acute.

Canada relies on global supply chains for much of its produce and their fragility has become more apparent through the pandemic, reinforcing the interest in and the need for production closer to home wherever possible.

Here, too, Vineland has a strong foundation: finding and adapting new varieties of produce and plants that can thrive in the Canadian climate and growing seasons, has been a focus since the organization's inception.

"We are already on the right track with key areas that we've identified as being important to Canadians and for the future sustainability and profitability of the horticulture sector and they're coming into even sharper focus now as a result of the pandemic," she says. "We are a small organization which gives us the nimbleness and flexibility to adapt to the new reality the world has been thrust into."

Fundamental to making that happen will be government support for innovation and there is also a strong role for businesses other than growers and other sectors of the Ontario economy to help move technology into primary food production. For example, the province has untapped expertise and potential in its manufacturing sector that could be adapted into innovative technology-based solutions on the farm.

Humphrey sees Vineland as being able to fill that critical gap by highlighting the opportunities and needs for technology in horticulture and matchmaking between sectors. And it's work they've already started in linking up with a local engineering firm to work on technology solutions for greenhouses.

"There are many industries and businesses that are unaware that agriculture is a growth sector and if they do know, they have no idea how to get into this market — and that's where an organization like Vineland can play an important role in bringing together partners," she says.

Despite the pandemic, or maybe because of it, it remains important to keep the big picture in mind, which means a profitable, competitive sector that can contribute to Canada's food and nutritional security. And although labour and automation are currently receiving a lot of attention, they're not the only issues at hand.

Climate change and other environmental issues are areas Humphrey believes need a strong innovation and adaptation focus. There's an opportunity for change as the Canadian economy begins its post-pandemic recovery.

Vineland is already working on the tools for the future," says Humphrey, "and we are also consistently looking even further ahead at what the needs of the horticulture sector might be 15, 20 or even 30 years from now.

"We are a small organization which gives us the nimbleness and flexibility to adapt to the new reality the world has been thrust into."

The tomatoes that Canadians want

There's probably no initiative illustrating more clearly Vineland's unique ability to deliver horticulture innovations meeting the needs of the sector than its tomato breeding program.

Over the last seven years, tomato breeding at Vineland has gone from an idea for new greenhouse tomatoes-on-the-vine for the Canadian marketplace to bringing seeds to market that are now being used in commercial greenhouse production.

In the process, that work has connected everything from grower outreach and consumer sciences to biochemistry and plant breeding — all aspects of Vineland's value proposition that sets it apart from other horticulture breeding programs. And it all began with a core understanding of what Ontario's greenhouse growers are looking for when it comes to growing tomatoes.

"One of the messages we heard from growers is that a tomato adapted to southern Ontario growing conditions must yield well, show good disease resistance and have a flavour preferred by consumers," explains Travis Banks, Vineland's Director of Plant Variety Development. "So, through every stage of breeding, year after year we were looking for selections that are the best performers as well as the best tasters."

Unlike many breeding programs that consider taste once they've made agronomic selection, Vineland incorporates consumer preference testing into its work right from the start. Its proximity to the Greater Toronto Area is of particular benefit in this field; the region's diversity provides a snapshot of different cultural preferences and offers a multi-faceted picture of what consumers prefer.

Three varieties that grow well in Ontario greenhouses and with taste that meets or exceeds what's already on the market were ultimately selected to move forward into commercialization.

But breeding what growers want and consumers like is only half the story.

Equally crucial is producing seed for those tomatoes in a safe, trusted way and ensuring they get to growers free of disease and ready to perform. To tackle this challenge, Vineland put its international connections to work in the search for a commercialization partner.

Travis Banks,
Director, Plant Variety Development

They found that partner in Eminent Seeds, a global seed company based in the Netherlands with a presence in Ontario.

"We were looking for a partner with experience producing tomato seeds for the Ontario greenhouse sector meeting Ontario producers' standards and we cast our net across the globe for our search," says Banks. "Eminent Seeds were looking to strengthen their offering for Ontario and we wanted someone who could get these new varieties into Canadian greenhouses."

The seeds are now available on the market from Eminent, the official distributor of the three new Vineland varieties. The company is also working with several Ontario growers on additional trials on the selections.

Tomato-on-the-vine seed in Canada is dominated by Dutch varieties and their breeding programs take a world-wide focus instead of tailoring to the needs of individual markets like Canada, which is only a small producer in the global market.

"The power of the breeding program at Vineland is that we get to work with Ontario greenhouse growers and focus on the needs and preferences of the Canadian market — we are offering a tomato bred, selected and sold in Canada for Canadian growers designed to yield best, right here in Canada," Banks says.

The current focus of Banks and his team is a shift towards improving these first three selections through further breeding to enhance both flavour and disease resistance as new plant viruses affecting tomatoes are always emerging.

Why it matters: the power of local adaptation

Canada accounts for only 0.5 per cent of the world's tomato production. Currently, three Dutch tomato-on-the-vine varieties dominate Canadian greenhouse production, accounting for the majority of the marketplace. They are bred for the Dutch climate and perform best in those conditions. The new Vineland-bred varieties, by comparison, have a uniquely Canadian focus and will help Canadian greenhouse producers stay competitive in a tough global market.

Why it matters: new products that hit the mark for growers and consumers

It can take up to a decade or longer to bring a new fruit or vegetable variety to market, making it key that each one will deliver for both growers and consumers. That's why consumer insights research, from the eating experience to packaging perceptions, is a vital aspect of new product development and Vineland is unique in being able to offer this service specifically for fresh horticulture crops.

Consumer insights for market success

Understanding consumers and giving them what they want is important to the success of any new food product coming to market. It's even more critical for fruits and vegetables because of the length of time it takes to breed and launch new varieties.

That's why the consumer insights team is a key partner in innovation activities at Vineland and has played a valuable role in establishing the organization as a leader in product positioning and consumer market research in the sector.

"We know what the opportunity is from understanding the flavour profile or appearance of a new fruit, or vegetable or flower and how that strengthens our breeding programs to influence the products in our innovation pipeline," says Amy Bowen, PhD, Vineland's Director of Consumer Insights. "And it's not just important to Vineland, it's work that can be critical to help a company positioning a new horticulture product in the marketplace."

Historically, the consumer insights work has been linked to Vineland research grants or projects with industry partners, but now Vineland is making those services available to the broader horticulture industry on a fee-for-service basis.

"We can help businesses and organizations who are looking for quick turnaround of results that will support whatever stage of product development they're in, from deciding what varieties to move forward with to naming, branding or determining what resonates with consumers in terms of market positioning," Bowen says. "It's not so much a shift in focus for Vineland as it is a natural progression towards making our expertise more broadly available."

Their services include consumer taste tests, online surveys, focus groups and interviews, demographic data, instrumental and statistical analysis of product characteristics and sensory profiling by a trained group of panelists.

The Vineland consumer insights team has expertise in sensory and consumer science, with backgrounds in biology, food science, psychology, oenology and culinary arts. And that's supplemented with access to the rest of Vineland's in-house scientific and engineering network.

As well, Vineland's team has knowledge of horticulture, its variability and an understanding of how harvest dates, ripening windows, growing seasons and storability can impact flavour, texture and the ultimate consumer experience.

"There are many companies that do this research in the packaged goods sector, but it's pretty unique in primary horticulture," she adds. "We also have the advantage of being able to access information from our industry partners and stakeholders so we can tackle relevant issues related to production practices, including pesticides, sustainability or GMOs. This adds to the robustness of the information we collect."

Amy Bowen,
Director, Consumer Insights

COVID-19 has resulted in some adjustments to how consumer insights work can be carried out, such as increased physical distancing and ensuring tasting samples aren't shared between on-site sensory panelists. Even face-to-face consumer interviews have to be adapted since product tasting isn't possible when people are wearing masks.

"Our work has resumed and we've just had to be nimble and flexible to manage things as best as we can," she notes. "It doesn't make it impossible; you just have to be creative to come up with solutions."

Case Study

Setting the stage for the Arctic® Apple

Okanagan Specialty Fruits (OSF) — the company behind the non-browning Arctic® Apple — has been a long-time partner who has used Vineland's consumer insights expertise to position and launch the only bioengineered apple into the marketplace. Using the apple's own enzyme, the company simply "turned off" the enzyme that makes the fruit brown when cut or bitten.

"One aspect of our long-time collaboration has been our ability to talk to consumers about biotechnology in a way that keeps them open-minded, engaged and interested," Bowen says. "Also key, is our commitment to making sure our results are useful, impactful and delivered in a way that they can be integrated into commercialization strategies."

The relationship began in 2016 when OSF asked Vineland to identify messaging positively resonating with consumers and to determine segments of consumers most interested in purchasing Arctic® apples. This was completed through intercept interviews in four cities to identify messaging that was then tested in an online survey of 2,000 North American consumers.

A year later, mall intercepts in six U.S. cities identified the characteristics of the apples. Focus groups and online research in 2018 and 2019 were conducted to better understand packaging, the eating experience and the non-browning characteristic to support tagline development.

"The Arctic® Apple was developed through biotechnology. We knew from day one that we wanted to address this head on and share the value of the consumer benefits Arctic® delivers," explains Rebecca Catlett, Director of Marketing and Communications at Okanagan Specialty Fruits. "So, we engaged Vineland as a credible, independent and qualified consumer research team to collaborate with us on the development, testing and validation of our messaging. It's been very successful for us."

Last year, OSF again worked with Vineland, this time to complete a sensory claim substantiation study in three U.S. regions to identify consumer preferences between Arctic® apples to that of competitors.

The research showed consumers found the Arctic® apples to be better tasting, giving OSF new information upon which it can build future marketing campaigns.

"We continue to work with Vineland because the work they've done for us has given us actionable, data-supported results," Catlett adds.

Collaborating for innovation impact

Rose Buitenhuis,
Research Scientist, Biological Control

Rose Buitenhuis, PhD, Vineland's Research Scientist of Biological Control can't remember a time when she didn't collaborate on her research with someone from the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA).

The research scientist in biological control is part of a tight, three-way network of specialists at Vineland, OMAFRA and the University of Guelph (U of G) working closely together to tackle pest problems affecting the floriculture industry.

It's a collaboration that is part of Vineland's unique ability to bring value to the horticulture industry in ways that matter directly to growers.

"There are not many researchers working in greenhouse biocontrol in Canada so working independently is not efficient. We have complementary skill sets and contacts that are invaluable when it comes to finding effective solutions to problems affecting growers," Buitenhuis says.

OMAFRA's greenhouse integrated pest management specialists are a principal link between Vineland researchers and the grower community, with focused insights into what is important to the industry and what pest challenges growers are struggling with. They're also key to helping identify potential test sites for research trials and bringing forward new research ideas.

Thrips feeding damage, as seen on these potted chrysanthemum flowers, is one of the largest sources of crop losses in greenhouse floriculture

U of G scientists support entomology work at Vineland and the Ontario Agri-Food Innovation Alliance (formerly the OMAFRA-University of Guelph Partnership) is a key source of funding for biocontrol research projects. Buitenhuis also serves as an adjunct professor at the U of G, which includes lecturing in courses and supervising graduate student research, a role critical to the future of the horticulture industry, she believes.

"Some of these students will go on to have careers in agricultural research or become growers so these are our future clients and skilled personnel in the industry," she says.

A current project into onion thrips is a perfect example of Vineland's relationship with OMAFRA and the University of Guelph in action. Thrips is a pest affecting a wide range of ornamental plants causing widespread damage that renders plants unsaleable.

Onion thrips under light microscope

Flower growers had always believed that western flower thrips was their dominant thrips species, but it was OMAFRA's Sarah Jandricic, PhD who discovered a case of mistaken identity and determined the real culprit as onion thrips. She brought her discovery to Vineland's attention and together with Buitenhuis and U of G entomologist Cynthia Scott-Dupree, PhD developed a research project to address the issue.

Vineland employee and graduate student Ashley Summerfield has been working with Jandricic to establish a clearer picture of the onion thrips problem in floral greenhouses: how the pest impacts different crops, how it differs from western flower thrips and how to best monitor for it.

Working closely with Buitenhuis at Vineland, Summerfield is testing various theories and possible biocontrol solutions including different predatory mites. Scott-Dupree adds her toxicology and biopesticide efficacy expertise to the team and oversees the administrative aspects of the graduate work.

The final step in the project will be to take all the research results and develop an effective biocontrol program that will work on both thrips species.

Past projects involving the three organizations have looked at pests like spotted wing drosophila and using banker plants for Orius in thrips control. And the collaboration spills over into other activities beyond research too, where Vineland comes together with OMAFRA to develop tools and resources for grower education and outreach.

"We all have overlapping skills and we bring our collective knowledge to the table for the betterment of the industry," says Buitenhuis. "It's all part of Vineland's focus on creating innovative solutions that will have direct, positive impacts for horticulture growers."

Thrips feeding damage on potted chrysanthemum flowers

Why it matters: The power of partnership

Canadian greenhouse flower growers need pest control solutions specific to their crops and their environments. By collaborating on solutions with OMAFRA and the University of Guelph, Vineland can harness knowledge and skills and leverage funding opportunities to achieve solutions that wouldn't be possible if each organization worked independently.

Vineland's role in the automation of horticulture

Hussam Haroun, Director, Automation

Hussam Haroun joined Vineland in early 2020 as Director of Automation. It was a timely appointment as COVID-19 had put a sharper focus on the challenges in Canada's food systems and the need for automation, particularly in labour-intensive sectors like horticulture.

Canadian agriculture is facing a growing labour shortage, one that is expected to reach 123,000 jobs by 2029. The shortage is due to a combination of increasing production, a rising number of retiring individuals and fewer young people interested in primary production jobs. The rising cost of labour is also a challenge; in horticulture, it represents 40 to 60 per cent of production costs for growers.

Addressing horticulture's labour crunch is an area where Vineland has already been focusing its expertise in both plant science and automation in an effort to provide the sector with solutions for specific growing, harvesting and postharvest activities.

That involves both global scouting for existing technologies that can be adapted to fruit and vegetable production, as well as developing solutions from the ground up to directly address challenges facing Canadian growers.

Vineland's current activities are centered primarily around automating harvesting, a particularly labour-intensive part of the production cycle for fruits and vegetables, with ongoing work on automated mushroom and cucumber harvesting solutions.

It's been a complex process that has underscored the reality that no one company or enterprise in the sector has the experience, time and resources to bring such innovations to market successfully on its own.

Robotics are nothing new in other sectors, like the automotive industry, where they are widely deployed in car assembly. However, using robotics in fruit and vegetable production requires a new decision-making process driven by artificial intelligence.

To automate harvesting, for example, a robot has to be able to both identify the fruit on the plant and determine whether or not it is ripe for harvest. And it must have the capacity to remove and handle the ripened product without bruising or damaging it, so it still looks good when it gets to the store shelf.

"With automation, we can solve the labour shortage problem, while also bringing a new generation of workers into the industry by being able to offer people challenging jobs as engineers, technicians and system operators," explains Haroun.

In postharvesting, many of the technologies that would help growers lessen their reliance on a human workforce already exist in various capacities, he notes. So instead of starting from scratch, a system integrator comes into play to pull everything together and adapt and build solutions.

Broadly speaking, an integrator assesses technical needs and using a broad knowledge of new and available technologies, develops and implements strategies to deploy the most effective solutions.

This is where Haroun sees a prime opportunity for Vineland to harness its knowledge of the horticulture industry, its networks and experience in automation. He likens the integrator role to that of a general project manager in the engineering world and believes strongly in Vineland's unique value proposition for this approach.

"There is opportunity across horticulture in postharvesting for this type of model and for Vineland to take on this role because of our expertise, our networks and our market-driven innovation environment," he notes.

The organization is now leading the development of an automation strategy for the sector incorporating the system integrator focus for greenhouse production.

The goal of this strategy is not for Vineland itself to develop and bring innovations to market, but instead to act as a connector and conduit of knowledge between horticulture and the technology sector to enable innovation and raise awareness of opportunities in agriculture.

"We are bringing together different specialties and companies to develop products that are tested and ready for commercialization partners to bring to market," Haroun says.

"We have end-user product experience and knowledge of what growers need, along with plant scientists, automation scientists and in-house engineers, which make Vineland uniquely positioned to drive innovation in this space," he adds.

Why it matters: a coordinated approach to innovation

Horticulture is the most diverse sector of Canadian agriculture, with over 150 fruit and vegetable crops in addition to a wide array of ornamentals. It's also the most labour-intensive agricultural sector and the one where automation technologies could make the most dramatic difference. Vineland's leadership position as a centre for horticultural innovation, coupled with its automation expertise and close connections to the grower community make it ideally suited to lead the sector's transition to automation.

Vineland's automated mushroom harvester

Leading the way to healthy Canadian landscapes

Vineland is on the cusp of an exciting new chapter in its long-standing urban greening work. A value chain-wide consortium is being established to help address common urban landscape challenges and will be accompanied by new infrastructure on the Vineland campus dedicated to greening Canada's landscapes.

Urban greening, the creation of greenspace in urban environments, is a key building block in fighting climate change and ensuring sustainable living in our towns and cities. Unfortunately, tree failure in urban plantings is extremely high, a costly problem for municipalities and the landscape industry.

That's why, for more than a decade, Vineland has been at the forefront of research into how to improve tree survival and increase the sustainability of urban trees and shrubs through its Greening the Landscape program.

"This new initiative is about addressing research gaps that are common across the whole stakeholder spectrum and being able to identify and trial solutions in real world landscapes that will have widespread benefits," says Darby McGrath, Vineland's Senior Research Scientist in Environmental Horticulture. "The economic impacts of failed urban plantings are considerable and a coordinated approach to horticulture research will help increase the competitiveness of the nursery landscape sector in a multitude of ways."

Darby McGrath,
Senior Research Scientist,
Environmental Horticulture

COVID-19 has made this new Vineland venture even more timely. A sudden spotlight has been put on the availability and accessibility of greenspace in urban areas, and it is now a hot topic for cities trying to re-imagine their post-pandemic futures.

Landscape Ontario is a strong supporter of Vineland's new direction in urban horticulture and the new consortium. It's the next evolution of the longstanding relationship between Vineland and Landscape Ontario, a key supporter in the original development and launch of Vineland as a horticultural innovation hub more than a decade ago.

"Landscape Ontario has witnessed small investments reap huge rewards with respect to industry development. Every interaction we have had with the Vineland team has resulted in long-lasting benefit," says Landscape Ontario Executive Director Tony DiGiovanni. "The activities of the new consortium and the projects it will lead at Vineland will bestow benefits for generations to come."

Landscape Ontario is Ontario's leading horticultural trades association and its more than 2,000 members represent a wide range of landscape professionals from designers, grounds managers and growers to garden centres, contractors and lawn care specialists.

"Landscape Ontario is a leader in this industry and their support is a vote of confidence for Vineland and this new initiative following years of partnership and support," says McGrath. "We are a results-driven organization so having the right partners is very important — that's where we will see real change happening at the grass roots level."

Consortium stakeholders will include municipalities, conservation authorities, the provincial government, non-governmental organizations, suppliers, nurseries, landscape professionals, architects, professional associations, developers and consultants. The group of founding consortium members will play a crucial role in determining the first slate of projects that Vineland hopes to launch soon. Long-term, consortium members will help determine research priorities for urban greening work at Vineland to ensure the projects are relevant to the needs of the sector and help support its economic success.

"A coordinated approach to horticulture research holds significant value and this is going to bring everyone in the urban greening or urban forestry value chain together," adds McGrath. "We're looking forward to working with new participants as this initiative unfolds."

Why it matters: dollars that make sense

The typical tree lifespan alongside a major roadside, for example, is only five to 10 years before it dies and must be replaced, resulting in additional costs to both the municipalities and the landscape industry. For the urban greening industry, solving the problems behind tree failure is an important part of its future economic sustainability.

Harnessing global innovation for local results

Vineland has made a name for itself in Canada by bringing new technologies and new fruits and vegetables — both non-traditional crops and new varieties of long-time favourites — to the Ontario and Canadian markets.

It's a multi-pronged approach, according to Phillip Stephan, Vineland's Vice President of Business and Client Development, who notes Vineland actively "shops the world" for interesting varieties and technologies that could benefit the Canadian horticulture industry.

At the same time, Vineland utilizes its far-reaching network of other breeding programs to bring new varieties for commercialization. Vineland also works to commercialize new varieties stemming from its own breeding activities.

The close working relationship with growers, industry partners and commodity organizations means Vineland's team is keenly aware of what is needed to enhance the competitiveness of the sector.

"We prospect for the new, seeking out possibilities that would be specifically well suited to the Canadian context and bring our discoveries back to Vineland for testing and evaluation," Stephan says. "At the same time, we take on the role of commercialization broker for institutions such as Agriculture and Agri-Food Canada (AAFC) and the University of Guelph that come to us. We have the specialized ability to identify varieties with exciting potential and develop compelling and licensable data packages for them to bring to market in Canada and internationally."

**Phillip Stephan,
Vice President,
Business and Client Development**

Regardless of the approach, Vineland's core goal is to create new market opportunities for Canadian growers to ensure their competitiveness and to expand local produce options for consumers with crops that will grow well in our climate and shorter growing seasons. And since plant breeding in particular is a long-term process, there is always something new in the Vineland innovation pipeline.

Tender fruit

In fruit production, the sweet spot for growers is the early or late phase of the season. An early ripening sweet cherry variety developed by the University of Guelph has caught the attention of an international nursery group focused on tree fruits and it is now being tested in Canada, the United States and seven other countries.

Vineland is the exclusive commercialization partner for this new cherry variety, tasked with the responsibility of promoting it to potential growers. The organization has taken on a similar role for the new pear variety *happi* developed by AAFC and now in the commercialization process.

"As a grower, you make the most money if you have crop coming to market in the shoulder seasons and this variety has the right size, colour, sweetness and timing," says Vineland's Technology Scout Michael Kauzlaric, who also leads grower outreach.

A new peach variety bred by the University of Guelph that has ripe fruit at least seven days before the current earliest peach in Ontario is also generating a lot of interest. It's expected to start being available in grocery stores in 2021.

Early ripening cherry developed at the University of Guelph and being commercialized by Vineland

New pear variety *happi* currently undergoing consumer testing

Excitement is also building around Jupiter, a new seedless table grape with a later harvest window that could see fresh Ontario grapes as part of Thanksgiving meals in the future. Several selections from U.S. and European breeding programs have also been planted at Vineland for evaluation.

"We are continually looking for fruit varieties with different harvest windows or those better than what's in the marketplace right now, which is what will provide benefit to both growers and consumers," Kauzlaric adds.

Roses

Two new beauties are slated to be added to Vineland's growing 49th Parallel Collection of bred-in-Canada garden and landscape roses. Aurora Borealis™ will be officially released in 2021 and the first yellow rose in the collection, Yukon Sun™ will become available in 2023.

Both of the new releases fulfill Vineland's key priorities for the program: roses that can be planted virtually anywhere in Canada that are cold hardy and highly black spot resistant. They were developed in collaboration with the Canadian Nursery Landscape Association which has rights to varieties from the discontinued Agriculture and Agri-Food Canada hardy rose breeding program.

Vineland has also begun licensing several selections that will soon become members of reputable collections managed by other organizations and is involved in international trials of some of its roses in Europe and the United States thanks to its wide-reaching global network.

"We have strict parameters for Vineland's 49th Parallel Collection roses, so we have beautiful flowers that don't meet our criteria but could offer an opportunity to growers in other climate zones while providing benefits back to Vineland and our Canadian rose breeding work," says Business Development Advisor Amanda Moen.

On the horizon

But new varieties are only part of the equation. COVID-19 has brought to the forefront many issues that have long been part of Vineland's focus, like the horticulture sector's vulnerability to external labour forces and the critical importance of competitiveness in a global market.

The Vineland automation team has already been working on solutions for automating fruit and vegetable production for several years, positioning the organization well to continue its leadership role in ensuring domestic food security while reducing risk and improving efficiencies in the horticulture sector.

"Growers need products that work in the Canadian environment while also being able to meet some of those fundamental challenges facing Canadian food production. These have to happen in tandem and Vineland is uniquely positioned to help achieve that," notes Stephan. "There are many great opportunities in the horticulture business and Vineland's focus on innovation will play a pivotal role in helping the sector realize those opportunities both now and in the future."

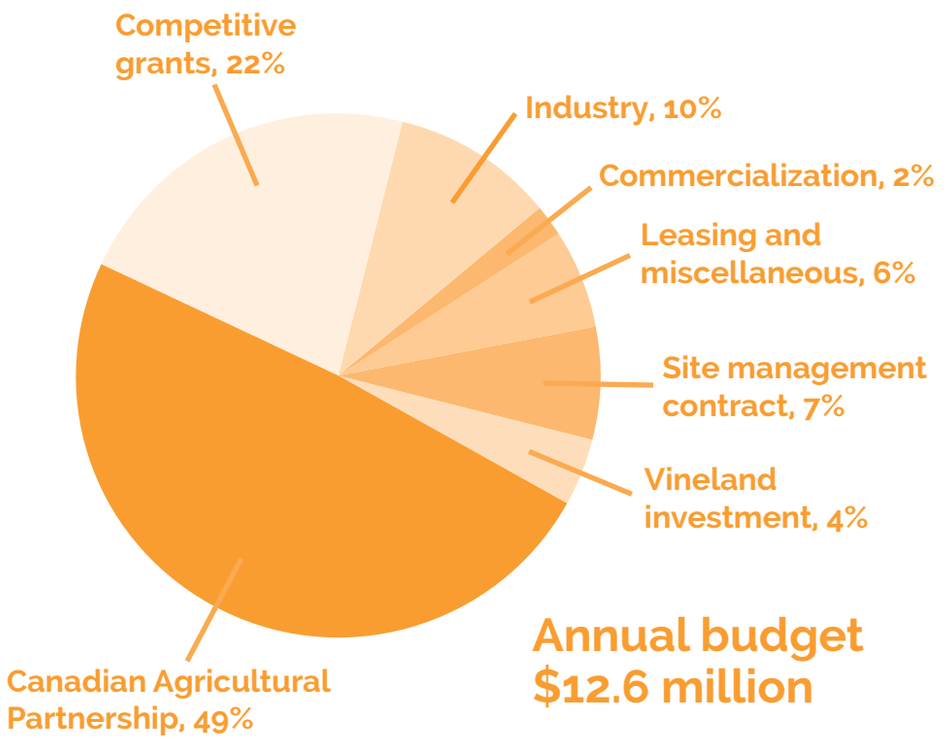
Yukon Sun™, the 2023 addition to Vineland's 49th Parallel Collection of roses

Why it matters: The best tools for Canadian horticulture

Canadian fruit and vegetable growers operate in a highly competitive, global marketplace. They need the best agronomy and technology solutions adapted to Canadian growing conditions, labour challenges and global uncertainties to help them remain profitable.

Vineland at a glance

Revenue April 1, 2019 – March 31, 2020



Annual budget $12.6 million

Frequently Asked Questions

Partnerships

143 partners*

98 industry **14** academic
31 government

From

8 **Canadian provinces** (Alberta, British Columbia, Manitoba, New Brunswick, Nova Scotia, Ontario, Prince Edward Island and Québec)

15 **countries** (Australia, Belgium, Canada, China, France, Greece, Germany, Luxembourg, Netherlands, New Zealand, Spain, Switzerland, Taiwan, United Kingdom and United States)

*For fiscal year 2019-2020

Commercialization

10 Vineland developed technologies with patents issued/filed

26 plant varieties protected by PBR and/or U.S. plant patents

8 trademark applications filed

44 technologies commercialized

84 per cent of Vineland's protected IP is out-licensed and/or under further collaborative R&D with business partners

Research capacity and performance*

12
research scientists

$350,673
research intensity (research revenue generated per researcher)

$17,900
innovation strength (royalties generated per researcher)

68%
grant application success rate

59
peer-reviewed publications (cumulative total)

783
citations (cumulative total)

*For fiscal year 2019-2020

Job creation, education and training*

78 full-time staff

49 highly qualified positions

7 PhD students underway

2 MSc students graduated, 3 more underway

3 co-op students hosted each year

*For fiscal year 2019-2020

Karen Belaire,
Board Chair

Vineland's Board of Directors (2020-21)

- Karen Belaire, Board Chair
- May Chang
- Greg Devries
- Kristin Ego MacPhail
- John Groenewegen, PhD
- Lori Hall
- Fred Koornneef
- Christy McMullen
- Mark Picone
- Ian Potter, PhD, Vineland President and CEO
- Ray Price
- Allan Visser

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.

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

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CANADIAN AGRICULTURAL PARTNERSHIP

Ontario

Canada