# THE 2016-2017 INNO ATION REPORT

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# Collaboration – the one constant

#### The days of scientists toiling alone in their laboratories are over.

Proof of that happens every day at Vineland Research and Innovation Centre (Vineland) where collaboration with other scientists, growers, businesses and consumers is the rule rather than the exception.

"We never work alone," said Jim Brandle, Vineland's CEO. "Our model focuses on increasing the number of acres in the field and shelf space in the grocery store for Canadian horticulture products."

And partnerships are key to getting that valuable space in farmers' fields, orchards and greenhouses to grow what will sell, or to create tools that enable the industry to work smarter not harder.

With about 75 of the best horticultural scientists in the world, Vineland has an impressive brain trust that's made mightier by reaching out to others elsewhere.

They use science to solve important problems and to capitalize on the results.

Take the hunger for a greenhouse tomato that will appeal to consumers more than the versions currently available at the grocery store. Or the need for new tools in the nursery industry to help young trees survive and thrive in the urban canopy. Even the desire of Canadian gardeners to grow a rose that can stand up to disease and a Prairie winter.



Vineland's CEO Dr. Jim Brandle

For each of these conundrums, and others, Vineland scientists and their collaborators have either come up with an answer or are working toward it. "By tapping into the knowledge and expertise of others around the world, the results of our work can be brought to consumers so they'll be able to eat a flavourful caprese salad in the shade of a lush tree while enjoying the view of a stunning garden," said Brandle.

"You need to work with the best people if you want to achieve great things", he noted. "The prevailing focus on individual achievements is not impactful in the 21st century. It's now all about relationshipbuilding to bring great ideas to market."

Now in its ninth year of operation, Vineland "is a growing concern," he noted. More partnerships are on the horizon meaning more innovation to benefit us all.

"We've got a good portfolio of projects already creating impact with more to come. We're very bullish on working at the intersection points between engineering science, horticulture science and social science, that's where innovation happens. When those disparate research areas come together, that's where the big opportunities lie."

... more partnerships are on the horizon meaning more innovation to benefit us all."

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Editor Cheryl Lennox Director, Marketing & Communications cheryl.lennox@vinelandresearch.com

> Editorial Advisory Panel Daryl Somers Research Director, Applied Genomics

Michael Brownbridge Research Director, Horticultural Production Systems

> **Gideon Avigad** Research Program Leader, Robotics & Automation

> Amy Bowen Research Program Leader, Consumer Insights

Tania Humphrey Director, Strategic Planning & Research Management

> Lana Culley Director, Business Development

**Vineland Research and Innovation Centre** 

4890 Victoria Avenue North, Box 4000 Vineland Station Ontario, Canada LoR 2E0

905.562.0320

Cover - Vineland's Greening the Canadian Landscape

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vinelandresearch.com

# The dirt on healthy urban trees

#### It's a tough life being a tree in the city.

But Darby McGrath, a nursery and landscape research scientist at Vineland Research and Innovation Centre (Vineland), is determined to make it easier for trees to thrive in the urban canopy.

She's doing it by throwing dirt on the idea that if you plant it, a tree will grow.

That's often not the case, particularly for trees planted along highways, in new subdivisions or commercial areas, or anywhere else soil has been disturbed by major construction.

They languish in their new digs. The reason is clear, McGrath said. "The soil is the problem. The way that sites are finished after construction is the issue," she explained. "The equipment used to prepare these sites can destroy in 30 minutes soil profiles which took millennia to build. It's pretty dramatic."

As machinery backfills and moves over earth to cover newly planted greenery, it presses it down, making soil denser. Roots have a tougher time spreading through this compacted soil as a result, lowering the odds of tree survival even more. "It's like growing in concrete."

So McGrath, who's working with both the nursery and landscape sectors to improve tree survival, has come up with a way that makes it easier to be green and leafy: reduce compaction by adding organic matter to the soil when planting trees.

Of course, the question is how much. To help answer it, McGrath and her team have developed a tool that will predict compaction at construction sites. All that's needed are a few quick soil samples sent off to the lab to analyze existing organic matter. Those values can then be punched into McGrath's simple calculation tool on a user-friendly website, which will generate a report indicating the amount of organic matter required to reduce bulk density and bring soil up to snuff for tree survival. The website will also feature videos showing how to take proper samples and how to remediate a site. It's a fast and inexpensive way to determine soil quality after construction has finished. Anyone, anywhere will also be able to use the tool, which was created using more than 1,000 soil samples collected by McGrath and her crew.

Users will also be linked to a species selection and recommendation tool based on soil results, preferred maintenance plans, and the climate in the trees' prospective new homes.

"We all want green space but budgets are often tight so we had to come up with something that had economic and ecological feasibility. This is trying to find that sweet spot."

McGrath put her findings to the test when the soil quality tool was used to help plant some of the 117,000 trees that will take root along a stretch of Highway 401 in Ontario known as the Highway of Heroes, between CFB Trenton and the Coroner's Office in Toronto. It's the road travelled by all funeral convoys of fallen Canadian Forces men and women, and one tree will be planted along the route to honour each who has died throughout our country's history.

"It's important that the trees planted in honour of fallen Canadian soldiers survive because they're a tribute to the sacrifice they have made and we are really proud to be a part of that," McGrath said. "Right now, we're promoting the importance of soil quality on tree health and ultimately our urban canopy. In agriculture, soil is the first thing that comes to mind but it's often not the case with landscaping at the end of a construction project. We're trying to take a bit of the guess work out of it."





Dr. Darby McGrath, Vineland's research scientist, nursery & landscape

#### **Rooting for propagation perfection**



Darby McGrath knows that all good trees start from the ground up — below ground, actually — and even before they're planted.

Problem is, the tools available to nurseries don't always enable trees to take root in the best possible way. If anything, they can set trees up for serious defects right from propagation because of flaws in the containers used in those early stages of growth.

The propagation trays commonly used in the industry make it easy for tree roots to become problematic. The walled containers force roots to drive down deep into the soil substrate, and when they reach the bottom of the pot, they start to circle around into a tangled mess of deformities that prevent them from properly absorbing water and nutrients when they're planted.

But McGrath, a Vineland Research and Innovation Centre (Vineland) nursery and landscape research scientist, is trying to nip that in the bud, not just for the sake of the trees, but for the people growing them.

"Root defects are a huge issue," she said. "Some cities are beginning to reject nursery stock because of it."

McGrath is working with A.M.A. Plastics in Kingsville, Ont., to develop a better propagation container. Together, they've created prototypes that look like a typical nursery tray except the sides are removed, giving roots the room to grow out instead of down while minimizing contact between the substrate and the tray. In the process, roots dry out and are forced to branch out further, increasing their area and ability to absorb more water. That makes for more stable, healthier trees when they're finally planted in their permanent homes.

There are nine versions of the tray base being tested, each with different inclines and sizes of openings, to find the best candidate to foster optimal root growth during propagation. They're being tried on different species, as well, to account for different root systems.

McGrath and A.M.A., which is one of the biggest propagation tray distributors in Canada and will be the licensee for the new containers, are also developing recipes for substrate to use in them. Most nursery substrates are designed to drain moisture, but that won't help seedlings and saplings growing in trays that don't have sides to contain the water loss.

Together, they'll test different mixes, measuring the time it takes the substrate to dry out and the impact it has on seedlings.

"We ask so much of trees when we plant them into our urban landscapes which is why it is so important to get root quality right from the start," McGrath said. "We're excited to help growers tackle the challenges of producing trees that can thrive and become the future urban canopy."



### Say what? Talking science with consumers



Dr. Alexandra Grygorczyk, Vineland's research scientist, consumer insights

B lame Mary Shelley and her legendary character Frankenstein, but people who don't spend their days toiling in a lab find the word mutation, which simply means variation, downright scary. That's why Alexandra Grygorczyk, a consumer insights research scientist at Vineland Research and Innovation Centre (Vineland), is working to remind her fellow scientists to be transparent and avoid jargon when talking about their work outside of the office.

"People have different areas of expertise," Grygorczyk said. "I don't know anything about the financial world. Some people don't know science."

It was a variation in Grygorczyk's own work that led her to discover just how much words matter when talking about horticulture science with consumers. In 2014, she was studying people's perceptions of pest management, including disease resistant plants, and found that a third of the participants thought the term artificial pollination referred to genetically modified organisms or GMOs. It actually means pollinating plants by hand rather than using insects, and is commonly used to breed plants that hold fast against disease.

Biological agent, the term that refers to the insects and mites used in pest management, garnered worse reactions. Some thought it was synonymous with biological weapons. "I thought, 'Whoa, we need to be careful with the words we're using'," she said.

Grygorczyk delved into the causes of consumer reactions to certain words and after a series of interviews and surveys, came up with a few tactics scientists can use when talking about their work in a way people will understand. For starters, they should avoid any temptation to use human relationships as metaphors. Grygorczyk found people didn't respond well to scientists calling plants used in breeding as mother, father or baby. Though such concepts are easy to understand, it made some consumers apprehensive about the technologies involved because they couldn't help but imagine they were being applied to humans.

"Once you put it in a human context, it takes effort for people to remind themselves this is being done with plants, not people," she said.

Grygorczyk also found that younger consumers were more open to technology in food production than older ones; males were more receptive to that technology than females; and urbanites more than ruralites when neither have an agriculture background.

"People want to know where their food comes from. It's knowing how to talk about the sector to help people better understand it and become engaged," Grygorczyk said.

To do that effectively, three layers of communication need to be considered: word choices, how the message is framed, and who's delivering the message. More work is being done to determine the ideal approaches to all three.

"It's not about using pretty words to deceive people. It's about using appropriate language so people know what it really means and not have a negative reaction to certain words. This way they'll be more open to hearing about our work," Grygorczyk said.



## Appassimento chamber ups Ontario's wine game

ou've got to crush a lot of grapes to make wine. Most importantly, you've got to crush high quality grapes to make wine people will savour.

A proprietary Appassimento technology developed by Vineland Research and Innovation Centre (Vineland) is helping Ontario winemakers bring out the best in their grapes to turn out top-notch tipple. It uses controlled airflow to enhance the quality of fruit grown in cool climate areas where growing seasons can sometimes fall short.

Ultimately, it partially dries grapes when Mother Nature won't, boosting flavours, concentrating sugars, and contributing to more complex aromas in wines. It does it all without risk of losing harvests to birds, insects, disease or bad weather.

It sounds like magic, but it's science at work in a simple looking chamber, constructed by MTX Postharvest in Rockwood, Ont. The results are such that winemakers are lining up to have their grapes dried in a chamber housed at Vineland. Last year, Magnotta, Niagara College Teaching Winery and Sprucewood Shores Estate Winery all delivered harvests to the research centre to be helped along by spending time in the Appassimento drying chamber.

"It was very successful and they all want to come back again," said Lana Culley, director of business development. "Our model is to bring in new wineries to try it each year. The hope is that once a winery has seen and experienced what the chamber has to offer, they'll buy one of their own."

So far, Kew Vineyards and Rennie Estate Winery in Niagara have made the stand-alone units a permanent feature in their vineyards. Both wineries started working with Vineland in 2011 to develop a reliable method of partially drying grapes to make Italian-inspired Ripasso and Amarone-style wines as well as to improve the quality and consistency of their table wines.

Until some Ontario winemakers tapped the research centre for the job, repurposed tobacco kilns, fans, or fruit left on the vine to dry were methods used by the industry to create robust red wines. The chamber built by MTX with Vineland's technology provides more consistent results than any other method by pushing air vertically through grapes, which are stacked in crates.

"Kew and Rennie Estate have had great success," Culley said. "They're ecstatic by all accounts with the machine, with the grapes and with the wines it produces."

The chamber, which comes in two sizes, can dry 3.6 tonnes or 7.2 tonnes of grapes at once. MTX has also designed kits to build an Appassimento chamber within existing space inside a winery. Given the value the chambers add to winemaking, the large ones, worth \$68,000 each, offer an attractive payback of less than three years.

Still, Vineland is exploring different business models to minimize the financial risk to wineries and encourage greater use of the technology. Aside from offering wineries new to the technology the opportunity to try it at Vineland, the research centre is also looking at more unconventional partners to adopt it, including grape growers and DIY wine businesses. In the meantime, Vineland is customizing the method for one Niagara winery. The research centre is collaborating with Big Head Wines on four units that use ambient air temperature to dry grapes rather than the temperaturecontrolled technology of existing units.

"There's less technology built into them but they rely on the same proprietary airflow expertise that we developed," Culley said. "In theory, it would mean a less expensive way for the innovation to be adopted by wineries but we need to do the research to validate the results and demonstrate that it's a reliable tool in the hands of an Appassimento expert like Big Head winemaker Andrzej Lipinski."

*... Vineland is helping Ontario winemakers bring out the best in their grapes for top-notch tipple.*"



(L to R) David Vuyk, Vineland's research technician, postharvest engineering; Andrzej Lipinski, owner and winemaker, Big Head Wines; Dr. Bernard Goyette, Vineland's research scientist, postharvest engineering.



# Crafting a sustainable cider industry



Dr. Amy Bowen, Vineland's research program leader, consumer insights

#### Imagine an Ontario where nearly seven million litres of local craft cider are flowing into the market.

The Ontario Craft Cider Association hopes to make that a reality by 2020. But to see glasses filled and refilled with the best hard cider the province has to offer, the industry needs 16,500 tonnes of apples. That's just to start.

It's a tall order and one Vineland Research and Innovation Centre (Vineland) will help fill with its newly drafted cider research and innovation strategy done in partnership with the Ontario Craft Cider Association and Ontario Apple Growers.

It identifies five key issues that came to light during consultations with industry representatives and that need to be addressed to build the fledgling industry from apples to delicious end product. The issues include: taxation and fee structure for cider makers, access to markets, consumer awareness, innovation, and apples/juice supply.

"The entire industry is only just emerging," said Tania Humphrey, author of the strategy report and Vineland's director of strategic planning and research management. "We want to support it. Just as the Ontario wine industry grew and the craft beer industry is growing through strategic collaboration, it's critical to connect all the pieces. This plan pulls everything together to build it and grow it in a coordinated way."

The thirst for hard cider in the province is great. It's the fastest growing beverage sales category at the LCBO with imported and domestic cider sales topping \$73 million in 2015. Helping that tally, Ontario craft cider sales increased nearly 53 per cent between 2014 and 2015. However, craft cider makers need access to the best fruit to keep pace with that demand. Many use local fruit in their libations, but Ontario apples, which are grown for the fresh market, tend to be sweeter and lack the tannins necessary to make more complex ciders. Apples that do have the right flavour profile, such as Northern Spy, are either in short supply or not available locally because they're often difficult to grow. That's a problem that could hinder the industry's growth, Humphrey said.

"People are making do with what they've got but if they want to hit it out of the park and make a really good cider, they need to start thinking about the apples grown and the process involved in making it."

As the industry plugs away at the policy issues identified in the cider strategy, Vineland has already planted apple varieties suited to cider, including some from Europe, to see how well they grow in Ontario.

And this is where Vineland's consumer insights program leader Amy Bowen comes in. She will turn to consumers to establish the flavour profiles of cider already on the market, what consumers like or don't like about them, and how thirsty they are for something more complex.

She'll then see how ciders made with the new apple varieties grown at Vineland relate to those consumer preferences. "We're starting by getting the trees in the ground so we have a source of apples that we can evaluate on how they perform," Bowen said.

As work progresses and milestones are met, other industry partners, such as those involved in training cider makers or fine-tuning the science behind fermentation, will join the efforts to help the industry achieve its goal of self-sustainability.

"We're looking at creating a collaborative initiative to check many items off the list," Humphrey said. "It's bringing the right partners together and building momentum to address the issues and firmly establish the industry." ... Just as the Ontario wine industry grew and the craft beer industry is growing through strategic collaboration, it's critical to connect all the pieces."

To review the Cider Research and Innovation Strategy, visit vinelandresearch.com and check out media centre/latest reports.





#### It's the kind of approval rating that would make national leaders swoon.

Sixty per cent of consumers say they like the most commonly available greenhouse tomatoes sold in grocery stores. This means there's an untapped market for different vine tomatoes grown under glass.

It's a good thing a team of Vineland Research and Innovation Centre (Vineland) scientists are on it, in partnership with the Ontario Greenhouse Vegetable Growers. Together, they intend to develop two hybrid varieties of greenhouse tomatoes with new and different flavour profiles by 2020.

Their work started in earnest in 2013 when Vineland biochemist David Liscombe set out to compile the genetic and chemical fingerprints of hundreds of tomatoes. From those, Liscombe determined the top 56 most diverse lines of tomatoes, which would be presented to sensory and consumer panels for analysis.

Enter Amy Bowen, who finds out what consumers like in a tomato, focusing on flavour, that all-encompassing term referring to aroma, taste and texture.

The research program leader for consumer insights took those 56 varieties of commercial, heirloom and non-commercial tomatoes to Vineland's trained sensory panel to create flavour profiles for each fruit using attributes such as sweetness, bitterness, firmness, and smokiness. Once the sensory panel's work was done, a selection of 18 profiled tomatoes was provided to a consumer panel to glean their opinions. As the results came in, Liscombe identified the chemical compounds making up the tomatoes' aromas which play a significant role in a food's appeal. He compiled a list of compounds that the consumer panel associated with the liking and disliking of a tomato.

Those findings were then fed to vegetable breeder Valerio Primomo, tasked with using Bowen's and Liscombe's results along with information about tomato growing performance, to breed a new, flavourful tomato on the vine adapted for production in Ontario greenhouses.

Tomatoes high in aroma compounds that garnered negative reactions would be weeded out to ensure such flavour profiles aren't passed on to the next generation of great tomato on the vine.

"We're certainly putting a huge emphasis on aroma because while sugar is very important to the flavour of a tomato, aroma can modulate how you perceive sweetness and acidity," Liscombe said.

The program will also use rare variations in flavourrelated genes to create new aroma profiles that appeal to consumers. To do that, Vineland's scientists are collaborating with researchers at Université Laval and the University of Florida, whose own labs are identifying yet-to-be-discovered aroma genes.



However, no one is forgetting about texture in the process. Based on what she already knows about people's likes and dislikes, Bowen is trying to predict the ideal tomato mouthfeel and whether those coming out of Vineland's breeding program fall within those parameters.

"People don't like them too firm. They don't like them too soft. It's like Goldilocks. It has to be just right," Bowen said.

Once the texture is nailed down, tomatoes with the right consistency can be crossed with those with preferred volatile compounds to breed the perfect tomato.

But even then, the researchers' work won't be finished. Greenhouse producers need to be convinced to grow a new tomato variety. Breeding a tomato that produces at least as much fruit as the current varieties they grow will certainly help. It also needs to be resistant to disease.

The scientists have a deadline of 2020 to tackle everything on their tomato to-do list. Though it's coming quickly, the end goal is clear.

"We're not trying to create a tomato that everyone likes," Liscombe said. "The two new hybrid varieties we are developing are for consumers looking for tasty options beyond what is currently available."

#### We've got good flavour



Simplified graphic representation of Vineland's consumer insights tomato flavour preference map



# Patience and possibilities: Vineland's apple program takes root

aryl Somers looks out across a swath of Vineland Research and Innovation Centre's (Vineland) research farm and sees only possibilities.

Twenty thousand of them, to be exact, and each in the form of a young apple tree vying to produce the next great Canadian fruit.

"We hit a milestone this year," said Somers, research director of the apple breeding program. "We have budded our 20,000th tree, a significant achievement."

That isn't the only feat of the program, funded by the Ontario Apple Growers to create a new apple variety with equal parts appeal for growers and consumers, and to follow in the footsteps of other Canadian stalwarts such as McIntosh and Ambrosia, currently the apple of so many fruit lovers' eyes.

2016 marks the first year Vineland will reap a harvest from a sizeable number of trees planted when the program kicked off in 2011. That means very soon Vineland will have a sense of which of the earliest experiments are poised to bear the kind of fruit Somers is after, and those that fall short. Those that don't make the cut will be scratched from the program, their plots of precious earth given over to new contenders.

"In order to find the next great producing varieties, you need large numbers of trees. And we're hoping to find more than one," Somers explained.

Each tree in Somers' care can be traced back to a single seed, every one different and possessing traits that make the apple gene pool at Vineland deep. Some trees are tall, others are short. There are crab apples, regular apples, red and green, and varieties to hold fast against disease.

Next comes clonal propagation, creating eight trees for each of the best selections, ensuring enough of a sample to determine whether a particular lineage is worthy of carrying on.



Dr. Daryl Somers, Vineland's research director, applied genomics and Beatrice Amyotte, graduate student, applied genomics

"It's exciting. It's been a lot of hard work to now see 300 trees with fruit on them," Somers said. "We made the crosses, we planted the seeds and we can't wait for the taste test."

Though he's gleeful about how the research orchard grows, Somers said the real sign of success will be getting the stamp of approval from Canadian apple growers and consumers on new varieties. Vineland will use those evaluations when choosing which ones to release.

The work Vineland is doing has also enabled a national apple program to take root, which is good news for growers. It's one that should tie together work done at Agriculture and Agri-Food Canada in Summerland, B.C. and Kentville, N.S.

Canada isn't a powerhouse when it comes to apple growing, he noted, and different apples thrive in the country's vastly diverse regions, so it makes sense for public and private partners to work together. Vineland brings expertise in genomics and genetics while Summerland and Kentville have vast postharvest know-how.

"If you've already got (those centres) built, why not unify them?" Somers asked. "We're one conversation away from putting something down on paper. That collaboration is absolutely required. It's bringing the right partners together and that's exciting."





#### On a global hunt for the next great apple

The apple that's a real pleasure to eat and grow may already be taking root in someone else's backyard.

If so, it's Michael Kauzlaric's job to find it. The technology scout for Vineland Research and Innovation Centre (Vineland) has been travelling the world since 2010 in search of great fruit for growers to produce and consumers to enjoy. So far, he's found 30 varieties of apples in the U.S., Europe, New Zealand and Australia that are looking for room in Canadian orchards and on supermarket shelves.

Kauzlaric is currently testing them out in Vineland's test block to see how they fare in our climate and, eventually, on our taste buds. Samples will be provided to industry stakeholders for feedback, and to help determine whether a variety has potential.

"My goal with scouted apples is to provide a minimum of three seasons of fruiting to make the decision whether the tree is good, whether the fruit is good and whether to advance the variety," he said.

The ideal candidate won't compete with existing popular varieties on store shelves, such as Gala. Instead, it will fill gaps the Canadian industry is looking to overcome during the harvest season, ensuring a steady local supply of apples.

If one of the finds prove itself worthy in terms of flavour, yield and disease resistance, Vineland would become the variety's manager for Canada. As such, it would issue propagation contracts to nurseries to sell trees. There could also be an opportunity to license growers and marketers, and potentially for retailers to sell and market the variety to consumers.

But it's taken tenacity on Vineland's part just to get 30 varieties in the ground for testing because Canada isn't always on the radar of plant breeders looking to market the fruits of the labour; neither is a young horticultural research centre like Vineland.

"Relationships, confidence and access all play into scouting because when you start knocking on doors, people ask, 'Who's Vineland? Can the market in Canada support new varieties?'" Kauzlaric explained.

However, he's been proving the potential and prowess of both in apple circles around the world. Variety owners, who may have typically turned to a U.S. partner to handle licensing of an exclusive variety for all of North America, are now keen to give Vineland the nod to execute a Canadian strategy should their apples thrive here.

"A lot of variety owners have never tested in Canada so they're excited to move forward on that path," he said. "The reward is great because within five years, an apple could be commercially launched, and within eight years it could get onto the market."

Kauzlaric is also keeping an eye out for varieties that could work within Vineland's own apple breeding program overseen by Daryl Somers.

"We're not looking at just scouting apples," Kauzlaric said, "but the whole industry."







# vineland's



#### 49<sup>th</sup> Parallel Collection



... Our strategy keeps the collection fresh and innovative for consumers, whose tastes, we know, are always changing."





# Rose collection begins to bloom

#### he's a real Canadian beauty, and gardeners will be celebrating her coming out just as Canada kicks up its heels for its 150th birthday.

Meet the Canadian Shield<sup>™</sup> rose, a new variety branded and marketed by Vineland Research and Innovation Centre (Vineland). The bloom, which will be available at garden centres in time for Canada's birthday celebrations in 2017, is one of up to seven roses to be released in the coming years as part of Vineland's new 49th Parallel Collection.

Each flower in the line has been bred to thrive in gardens from St. John's, Nfld. to Victoria, B.C., meaning Canadian Shield<sup>™</sup> and its successors are no shrinking violets in our varied climate zones.

The roses are products of The Canadian Hardy Rose Breeding Program at Vineland in partnership with the Canadian Nursery Landscape Association. They've been bred for consumer appeal along with highlydesired low maintenance features including resistance to disease and cold.

They're versatile garden and landscape roses that stay stunning throughout the gardening season. Canadian Shield<sup>™</sup>, which was originally bred by Agriculture and Agri-Food Canada but never released, boasts more than one metre spread, full red flowers, glossy green foliage, and is a repeat bloomer.

"We saw it and it had a lot of positive consumer traits," said Lana Culley, Vineland's director of business development. "Now it's a matter of plotting out how to market it to consumers."

Much of the sales pitch has already been considered, from Canadian Shield's<sup>™</sup> looks to its name, which suggest strength of character and that it was bred to be hardy. Just as Vineland does with new fruit or vegetable varieties, the research centre turned to consumers to learn what they look for when making rose purchases. It found the preferred traits for roses aimed at a North American market to be: up-right bush, full petals, intense rose fragrance, dark green glossy foliage, and black spot resistance. Canadian Shield<sup>™</sup> is the full package.

The question was how to position the Canadian Shield<sup>™</sup> rose in the market. Roses have the unfortunate reputation of being high maintenance and Vineland is keen to target Canadian Shield<sup>™</sup> and others in the collection to millennials, expanding the market beyond avid gardeners. Vineland tapped Kitestring Creative Branding Studio in Hamilton, Ont. to create brand concepts that would resonate with consumers based on Vineland's research.

Those surveyed identified more with Canada's natural phenomena than its history, making a moniker like Canadian Shield<sup>™</sup> a rock-solid choice for conjuring the hardiness and the resiliency of the country. It's also, quite simply, beautiful. Calling the collection 49th Parallel also aligned with findings.

Vineland has since issued 20 licences to Canadian nurseries to propagate and grow 50,000 Canadian Shield<sup>™</sup> roses that will be available to home gardeners and landscapers to plant in time for Canada's 150th birthday.

The 2018 rose release was recently selected as well and its naming process is underway. "In the years ahead," said Amy Bowen, Vineland's consumer insights research program leader, "roses in the collection can be retired (and reintroduced by popular demand) to allow interest in others to blossom."

"Our strategy keeps the collection fresh and innovative for consumers, whose tastes, we know, are always changing," Bowen said.





# Cold Snap™ spreading and that's a good thing

#### It was the cool kid in Ontario supermarket produce sections last winter.

The Cold Snap<sup>™</sup> pear is poised to remain hot this year among consumers hungry for local fruit when orchards have long since called it a season.

The appeal of the new pear variety, which officially appeared on store shelves in branded blue bags November 2015, is growing beyond Ontario. As the world's sole licensee of the fruit, Vineland Research and Innovation Centre (Vineland) is helping the made-in-Canada Cold Snap™ pear become a wide-reaching phenomenon.

The Vineland Growers Co-operative, licensed to market the pear in Ontario and eastern Canada, is eyeing Quebec as the next region into which it will launch the fruit, and offer consumers something other than imports in January. Propagation of the Cold Snap<sup>™</sup> has also started in Europe.

"It's definitely a success story," said Lana Culley, Vineland's director of business development.

There's good news for those who already count themselves as Cold Snap<sup>™</sup> fans: more fruit will be available this winter, sold in signature bags, and for the first time in bulk and clamshells. The abundance comes from more than 75,000 Cold Snap<sup>™</sup> pear trees planted in Ontario and Nova Scotia reaching their harvest potential. Still, no one is leaving the heavy lifting up to Mother Nature when it comes to bringing out the best in Cold Snap<sup>™</sup> crops. Fine-tuning postharvest storage with a new controlledatmosphere facility and tweaks to the packing process mean consumers will be able to enjoy Cold Snap<sup>™</sup> pears at their peak.

"We hope that will translate into even better pears, and lasting flavour and quality," Culley said.

The Cold Snap<sup>™</sup> will also be available at Walmart, in addition to major grocery chains Metro, Sobeys and Loblaw.

"The pick-up was great," said Matthew Ecker, Vineland Growers Co-operative sales and business development manager. "And there was a lot of good interest and feedback from consumers. They all had the assumption that pears available in the winter were imported so they were happy to see a Canadian pear."

However, they'll never see too many of them. By capping the number of Cold Snap<sup>™</sup> trees planted at 75,000, both Vineland and the Growers Co-operative maintain a supply and demand "sweet spot," which ensures producers who have invested in growing the Cold Snap<sup>™</sup> will continue to receive a premium return.

"We want to make sure the pear stays in its niche market," Ecker said. "The second you have too much of something, it becomes a commodity."





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Se Gold



Dr. Michael Brownbridge, Vineland's research director, horticultural production systems and Taro Saito, Vineland's senior research technician, biological control



# A mite-y discovery

#### It's the kind of discovery that could be so big, you'd call it mega.

The kind that happens when you see the forest for the trees — and the mites living within them.

It was while roaming in a St. Catharines, Ont. bush that Taro Saito, a Vineland Research and Innovation Centre (Vineland) research technician, noticed a mite unfamiliar to him. Curious, he brought his find to work to show Michael Brownbridge, Vineland's research director of horticultural production systems, and together they learned they had "a very good predator" in their midst.

As it turned out, the mite had been investigated in U.K. apple orchards where researchers worked with growers to modify orchard management practices to create conditions that conserved the mites and allowed them to proliferate and control pests. That had Brownbridge wondering what it could do in greenhouses here. Many greenhouse growers already use insects and mites to tackle specific pests and reduce their reliance on chemical controls. But finding a predator that feeds on many pests and can fill gaps in pest management systems to further reduce or eliminate the use of chemicals, is a big deal.

"Very few new biologicals have been introduced over the last 20 years by the biocontrol industry," Brownbridge said. "There are some excellent biocontrol agents out there, but there is certainly a need for new predators to fill the gaps in our current arsenal, and to strengthen the overall performance of our biocontrol systems."

Many pests have become resistant to chemicals anyway, making effective biologicals or biocontrols those living organisms that can keep them in check that much more important. Cuttings are imported from Florida, Central and South America and Africa to start valuable crops here and they sometimes arrive with pests in tow that are virtually immune to chemical pesticides. With fewer chemical control options available to Canadian greenhouse growers than their colleagues elsewhere, pest problems can mount.

"Greenhouse horticulture is an important sector for Ontario," Brownbridge explained. "We invest a lot of time supporting the ongoing success of the sector through the research we're doing. We know growers are faced with ongoing challenges in pest management."

So far, the mite has performed well in lab tests. It's also shown its might in small-scale greenhouse trials. Now it's ready to be tested on a larger scale to determine if it can be commercialized.

Vineland is working with a company that produces, packages and ships biocontrol agents to see whether the mite can be produced in large quantities and arrive at a greenhouse "ready to go".

If all goes according to plan, Brownbridge envisions the mite becoming part of greenhouse growers' pest control arsenal in two to three years, and not just locally. The arthropods are native to several regions throughout the world, which will help it fly with regulatory agencies that prohibit the introduction of non-native generalist predators because of the possible negative effects they can have on an ecosystem.

"Potentially you've got a European market and a North American market," he said. "And it's native to Australia, so we're looking at an opportunity so much bigger than greenhouses in Ontario."





... There are some excellent biocontrol agents out there, but there is certainly a need for new predators to fill the gaps in our current arsenal, and to strengthen the overall performance of our biocontrol systems."



### Innovative automation technologies around the corner

#### Imagine a machine that can sense disease in a plant before any human can see it.

Or one robot with the intelligence to anticipate which mushrooms will grow into the best crop and culling others that don't make the cut.

How about a device that takes the guesswork out of irrigating crops, saving water, money, and the most valuable commodity of all, time?

It sounds futuristic, but welcome to the present at Vineland Research and Innovation Centre (Vineland) where, thanks to an investment from FedDev Ontario and several industry partners, these and other innovative horticulture and greenhouse technologies are being developed for commercialization.

All of them hold the promise of being cost-effective with a significant return on investment for growers with the introduction of labour efficiencies, disease detection and resource management.

"These are solutions to challenges that have not yet been solved," said Gideon Avigad, Vineland's robotics and automation research program leader.

The projects are at different stages of testing and completion, but each one requires partnerships with growers, colleges, universities and manufacturers to get as far as they have.

Vineland is already working with Callisto Mechanical in Niagara-on-the-Lake, Ont. to commercialize its automated plant and vegetable packaging system. With the design complete, they're now being shopped around to commercial users.

"We work to identify problems that growers' face that can be effectively solved through automation," said Darren Ward, Vineland's manager of business planning and commercialization. "We've developed some innovative solutions which are now at the stage where they're coming to market."





#### In the works

#### Automated mushroom harvester

• All about improving the quality and yield of tasty mushrooms while introducing production labour efficiencies

#### Smart irrigation

 Imagine an intelligent decision-making system, wireless sensors and hyperspectral imaging minimizing greenhouse water usage and ensuring healthy plants

#### **Disease detection**

• Hyperspectral imaging is key to reducing plant stress and disease with real impact to the bottom line for greenhouse growers

#### Automated plant and vegetable packaging system

 A cost-efficient way to improve packaging quality and consistency for maximum impact at retail

(L to R) Dr. Mohamed Kashkoush, Vineland's research scientist, data mining and optimization; Vance Badawey, MP Niagara Centre (behind); Jim Bradley, MPP St. Catharines; Chris Mohr, Vineland's mechanical engineer, robotics and automation; Chris Bittle, MPP St. Catharines; The Honourable Jeff Leal, Ontario Minister of Agriculture, Food and Rural Affairs





Vineland's collaborative greenhouse technology centre opened for the industry in 2016



With a highly-skilled research team, oversight from an independent Board of Directors, engagement from an international Science Advisory Committee and collaboration with more than 160 global partners including a Stakeholder Advisory Committee, Vineland's goal is to enhance Canadian growers' commercial success through results-oriented innovation.

We are an independent, not-for-profit organization funded in part by *Growing Forward 2*, a federal-provincial-territorial initiative.

info@vinelandresearch.com

4890 Victoria Avenue North, Box 4000, Vineland Station, ON LoR 2E0 905.562.0320

vinelandresearch.com



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