Case Study

Speeding up new plant variety development

Vineland's game-changing innovation for plant breeding.

A powerful technology developed at Vineland is shortening the amount of time needed to discover and bring new plant varieties to market. Vineland's proprietary Deep Variant Scanning (DVS) approach is a fast and cost-effective technology allowing plant breeders and seed companies worldwide to speed up the plant breeding process.

The spin-off company, Platform Genetics Inc., was launched in 2017 and in the last five years, more than 75 contracts for over 30 crops with more than 30 clients have generated significant revenues, with an excess of 80 per cent of sales originating from clients outside of Canada.

The opportunity

- Develop varieties with new traits matching consumer and production requirements
- Climate change and global population growth
- Existing genetic technologies limited by regulatory challenges and consumer distrust

The answer

- Sustainable and rapid non-genetically modified organism (non-GMO) technology
- Reliable technology with no usability barriers
- Any gene, any crop

From Illinois to Israel to the Ivory Coast, the world is coming to a Niagara region start-up company that grew out of innovative research at Vineland and became the go-to, trusted expert in crop trait development.

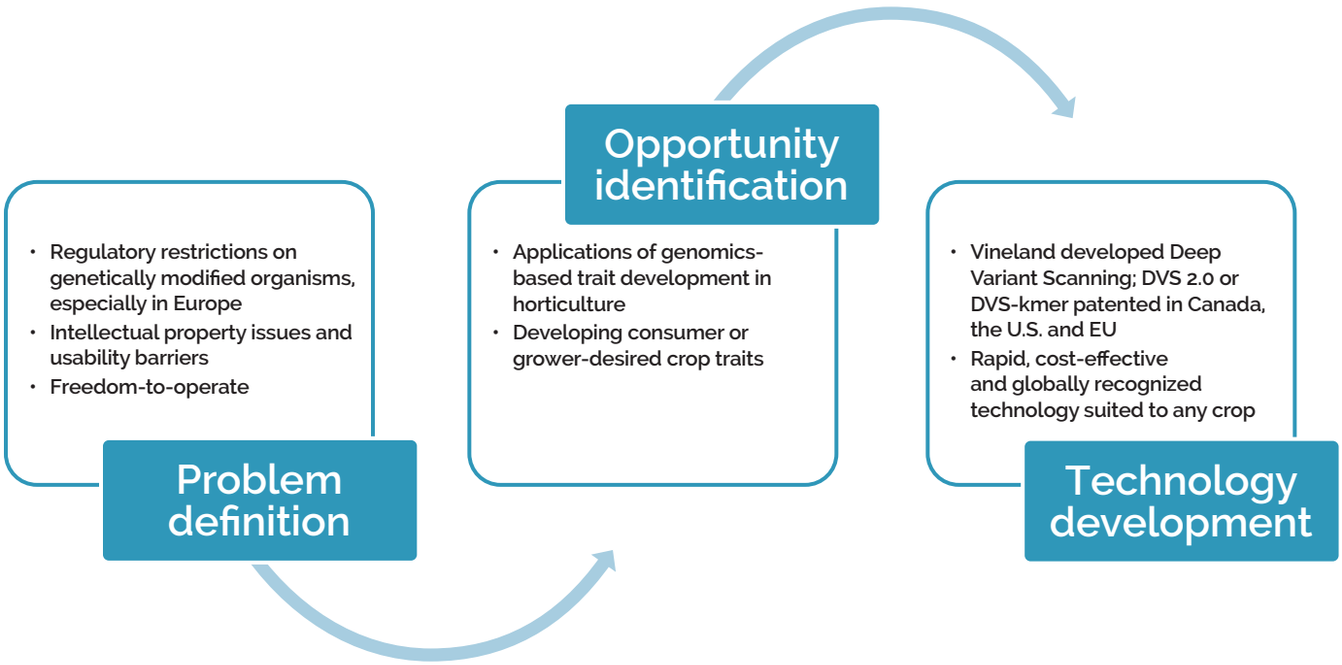
The need

With climate extremes becoming more frequent and the global population expected to approach 10 billion by 2050, the agriculture sector is continually looking for new ways to ensure the world has enough nutritious and affordable food.

One way is by breeding new plant varieties with higher yields that are better adapted to endure climate stress like drought and heat and require less fertilizer or crop protection products while also meeting consumer demand for taste, texture and nutrition.

Traditional plant breeding is a labour-intensive process taking years to develop and bring new varieties to market. Bioengineering tools introduced in the 1990s that could speed up the breeding process in field crops including corn, soybeans or cotton, faced consumer distrust and significant regulatory barriers in many countries around the world.

Through conversations with industry leaders in the vegetable and ornamental sectors, researchers at Vineland realized there was an opportunity to combine new DNA sequencing methods with chemically-induced variation to speed up the identification and development of important new plant traits.



The solution: Deep Variant Scanning

In 2012, Vineland launched the research program Developing Improved Traits for Horticultural Products which complemented traditional breeding and crop selection by developing traits that met specific consumer or grower needs.

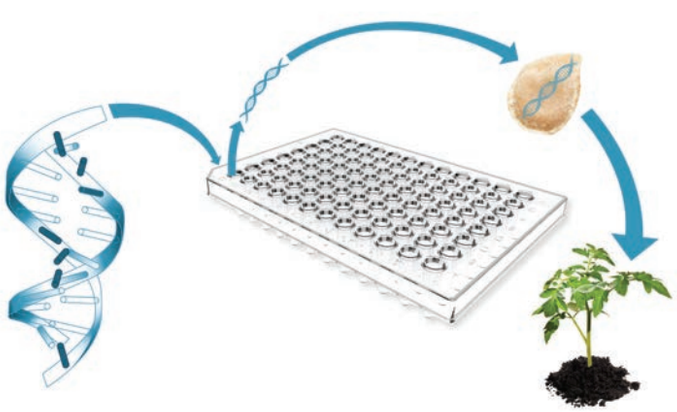
The first major breakthrough was the introduction of Deep Variant Scanning, Vineland's proprietary approach to trait discovery patented in 2016.

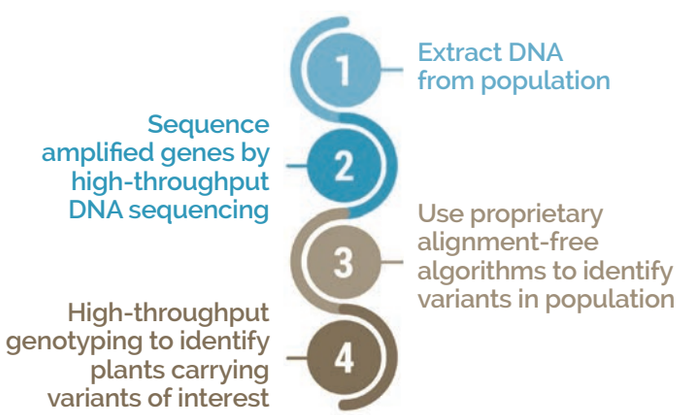
DVS uses genomic technologies that are able to sequence millions of DNA molecules at a time and combined with bioinformatics — the science of gathering and interpreting biological information like genetic codes — to identify new plant varieties with improved traits and higher yield or better quality.

Deep Variant Scanning enables the improvement in the efficiency of plant breeding programs by accelerating the development and selection process in bringing new varieties to market faster. It can be used to find variants in any gene for any crop, and because it is considered a non-GMO technology, it is not subject to similar regulatory challenges as genetically modified organisms or even other gene editing technologies like CRISPR.

Vineland began using this proprietary technology in its own breeding programs, such as developing more flavourful greenhouse tomato-on-the-vine varieties. And to bring this technology to the broader market, Vineland launched Platform Genetics in 2017, a spin-off company offering trait development and genomics services to the global seed industry. It is the exclusive licensee of the DVS technology.

DVS workflow





The impact

Over the past seven years, approximately $1.5 million CAD has been invested to develop and commercialize the DVS platform. The result is a rapid, cost-effective, powerful and proven technology for discovering rare genetic variants in large plant populations.

By using it, plant breeders and seed companies worldwide can move from gene target to seed carrying genetic variation in less than four weeks, harnessing the technology's platform for rapid trait development and crop improvement.

Platform Genetics has been growing rapidly since it was launched, surpassing major revenue milestones ahead of schedule and demonstrating the global demand for this technology.

Currently, the company works with a wide range of clients, from leading multi-nationals to venture-funded start-ups. This includes seven of the world's top 15 seed companies, public sector plant breeders, and academic and research institutions in nine different countries across four continents.

More than 75 contracts for over 30 crops — from tulips and marigolds to soybeans, potatoes and beyond — with more than 30 clients have generated significant revenues in the last five years. The company's global impact is evident with 80 per cent of sales originating from clients outside of Canada.

In addition to Vineland's tomato-on-the vine research program, Platform Genetics has been involved in projects as diverse as improving pea and soybean varieties to be better suited for processing, developing new oilseed crops for the Canadian Prairies and helping resolve genomics technology intellectual property disputes between seed companies.

"Platform Genetics is home to great scientific knowledge but also great understanding on how

DVS at Vineland

Before issuing an exclusive licence for DVS to Platform Genetics, Vineland successfully employed the technology to create flavourful tomatoes-on-the-vine. Several of the lines identified could be distinguished by trained sensory professionals and were preferred by average consumers. These desirable traits are being combined with other key production traits and the resulting commercial varieties will hit the market two to three years from now.

that knowledge needs to be applied in the industry for product development. That is a rare combination of skills. I have found with other providers that we needed to really direct the data analysis to the detail in order to get the desired output. Not with Platform Genetics."

— Mercedes Murua, Chief Technology Officer, The Plant Pathways Company

Looking to the future

Vineland will continue to work closely with Platform Genetics in providing access to research expertise, molecular biology and biochemistry laboratory spaces and equipment, research farm and a state-of-the-art pre-commercial research greenhouse.

Platform Genetics continues to expand its service offerings to ensure seed companies have the ability to make quick and well-informed decisions. Platform Genetics has progressed beyond a single-technology company and positioned itself as a strategic outsourcing partner to allow seed companies to manage risk and expand their innovation capacity.

What Vineland delivered

By the numbers (to date):

1 successful spin-off company

3 patents

30+ clients,
nine countries, four continents

75+ contracts for **30+** crops