

The basis of trait development, on standby

Platform Genetics, Vineland Research and Innovation Centre's new spin-off company, performs quick, precise genome editing.

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Platform Genetics is in possession of sizeable tomato populations that it can search for trait-changing variation per breeders' requests.

Photos courtesy of Vineland Research and Innovation Centre

If a breeder wants a different plant characteristic — and fast — they're in luck. A new company, Platform Genetics has updated a century-old technique to evolve a plant with 21st century efficiency. The company claims to be able to find new variation in a single gene with 99 percent certainty, which can lead to new plant traits such as color, leaf shape, growth habit or aroma.



Although Platform Genetics is a spinoff of the non-profit Vineland Research and Innovation Centre in Lincoln, Ontario, it operates as a for-profit company in offering its patented tool to breeders. Platform Genetics was founded in 2016, and has been operating for much of the second half of 2017, says Dr. Jim Brandle, CEO of Vineland Research and Innovation Centre.



Vineland Research and Innovation Centre performed Deep Variant Scanning (DVS) on these petunias prior to Platform Genetics' founding. Already, Platform Genetics has paired with breeders who are using the technology, Brandle says. However, the breeders have not yet delivered to market any crops developed via the technology. "In the breeding context, where you'd be in that pipeline, [we are in] the very early days," he says.

How it works

For more than a hundred years, breeders have been treating their seeds to create new traits. Whenever a plant makes new seeds, it naturally creates a few changes to its DNA. Using seed treatments such as UV-light or Ethyl-methanesulfonate (EMS), a plant makes more changes than it usually does, enriching the variation pool found in the batch of seed. If the plant changes the DNA of a gene in just the right way, a new and beneficial trait is born. The technology that Platform Genetics uses is called Deep Variant Scanning (DVS) and it allows quick identification of where thousands of plants have made those changes, and picks out the single plant a breeder is interested in. DVS is different than the well-reported genome editing tool Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) in that DVS does not modify the genome. Platform Genetics' proprietary technology uses DNA sequencing and computer algorithms to identify changes the plant has made. DVS is quicker than CRISPR, the latter of which takes about 12 to 14 months, Brandle says. Looking to improve disease resistance to powdery mildew in tomato, it took Platform Genetics only two weeks to identify the gene involved in resistance to the disease, and two months to phenotype it.



So far, Platform Genetics has primarily focused on the genomics of vegetables such as tomatoes.

Who it helps

The technology can aid growers and breeders in many ways, Brandle says. "It's going to give them the genetic variation they need, when they need it," he explains. "That genetic variation is the basis of trait development. Many of

these traits wouldn't otherwise be possible. You'd either have to do forward screens, which are inefficient, or they just may not appear spontaneously."

The DVS technology is also non-GMO, Brandle says. This is beneficial because regulators in Europe, where many breeders are located, have imposed restrictions on the production and transportation of genetically modified seed.

In practice, breeders can make use of the process in various ways. Platform Genetics is in possession of tomato populations, so in the case of tomato, breeders can tell the company what its gene targets are, and it will send a bag of seed back to the breeder. Breeders with their own populations can also send DNA to the company.



Color, aroma, leaf shape and growth habit are among the plant traits that Platform Genetics' DVS technology can alter in ornamentals such as petunias. Platform Genetics' technology is primarily useful to breeders, but it may be supported by growers, Brandle says. "We have a lot of public domain breeding programs, particularly in vegetables, as an

example," he says. The company believes it can help growers capture market share by using the technology to create traits consumers want, such as more flavorful tomatoes.

Much of the work that Platform Genetics has done with DVS has been on vegetables, although it has done some work with petunia as well, Brandle says, explaining that ornamental breeders can make abundant use of the technology. Exactly which characteristics a breeder seeks and acquires through DVS, depends on the plant. Taste, for instance, is not a characteristic to be improved upon in an ornamental crop, but color often is.

In any case, the technology usually homes in on a single gene, Brandle says. "The magic is really around DNA sequencing and software to help you find the gene — the plant that has the gene alteration that you're looking for."

<http://www.greenhousemag.com/article/platform-genetics-vineland-research-and-innovation-centre-deep-variant-scanning/>