FOCUS: GREENHOUSE INNOVATION

A more flavourful, locally-grown tomato on the vine is in the works

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Savouring a tomato starts before squashing it in your mouth. The eyes appreciate the artwork of the calyx. The nose smells the grassiness of the vine. Then taste buds evaluate the texture and sweetness.

Turns out there's more to breeding a more flavourful, locally-grown tomato-on-the-vine (TOV) than meets the eye. David Liscombe, research scientist, biochemistry, Vineland Research and Innovation Centre (Vineland) is at mid-point of breeding a better greenhouse tomato for the entire industry. He points out it won't be a club variety that's licensed to a few growers.

"It's a tall order," says Liscombe, "but we're lucky to focus on a single type of tomato, the red TOV, and not beef-steak, cocktail or cherry tomatoes as well."

Liscombe reports good progress on a breeding program that started in 2013 with the aid of research and funding partner, the Ontario Greenhouse Vegetable Growers. While the pristine environments of today's greenhouses produce high yields and beautiful tomatoes, growers are aware that taste is always what sells. To date, genetics have been developed in other countries under different growing environments. It's the goal to develop a tomato that's suited to Ontario's hot and humid summers with lower light levels in the winter.

In 2017, there are about 327 acres of TOVs grown in the province. So it's a quest worth pursuing until a variety is commercialized in 2021.

Vineland's expertise

Vineland has several advantages in this ambitious project. First, the opening of its pre-commercial greenhouse in 2016 was perfect timing to pursue research that could be replicated. Second, there is a group of researchers with complementary backgrounds to evaluate many traits.

"While the commercial product must have flavour, we're not to lose sight of other key production traits such as disease resistance and yields. Agronomic data is needed. We also need to recommend rootstock combinations."

Vineland is known for its consumer-centric approach to breeding challenges. Through sensory panels, consumers offer feedback on the varieties that are being developed. It's better to have a baseline of consumer preferences first before spending a decade on research.

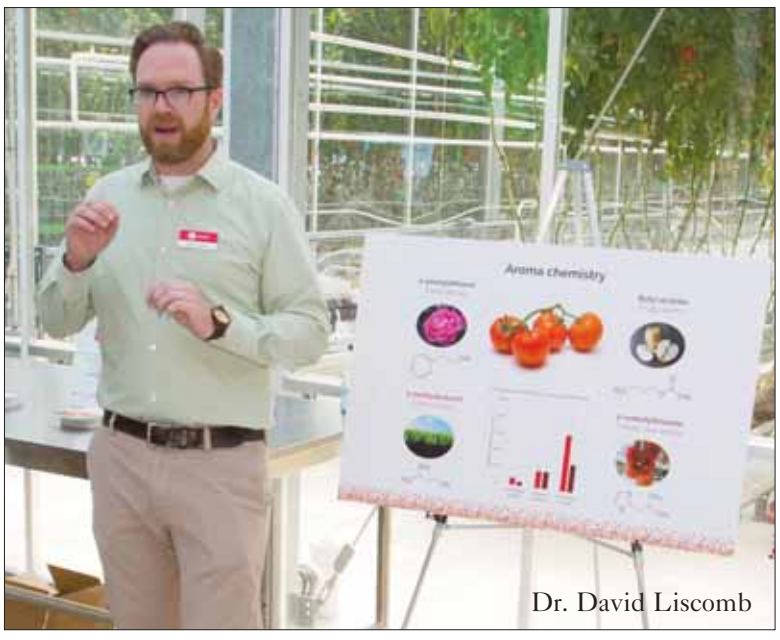
"Texture of tomatoes is very important," says Liscombe. "Consumers don't like a texture that is mealy or too firm. Once you have the texture, the sweetness and aroma come into play. There is no sweet spot for tomatoes as we found with apples. We're finding out that horticultural products are different in terms of preference drivers."

Complexity of tomatoes

Tomatoes, it turns out, feature a complex array of volatile compounds as part of their aroma. There may be less sugar in a tomato, but because of the aroma, the consumer may perceive it as sweeter. These subtleties are a challenge, especially as a consumer doesn't really "taste" the aroma of a tomato until it's cut open. The Vineland team is studying these chemical interactions in the pursuit of a perfect tomato.

This year, about 75 Vineland-developed hybrids are being tested in Ontario commercial greenhouses. Grower feedback will be channeled into the hybrids that are selected for planting in December 2017 or January 2018 for the upcoming season.

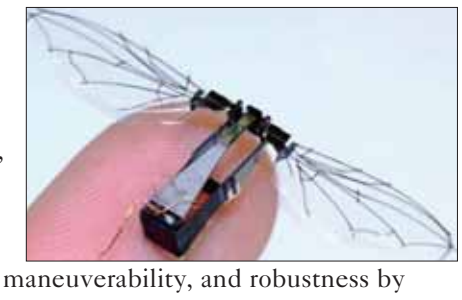
Commercialization is years away, but someone will have the tough job of clinking glasses and toasting a new name.



Dr. David Liscomb


These tomatoes on the vine are some of the 75 hybrids that have been developed at the Vineland Research and Innovation Centre for feedback from Ontario greenhouse growers.

Cornell University develops robotic insect to maneuver in small spaces



Flying insects can perform impressive acrobatic feats, simultaneously sensing and avoiding a striking hand or landing on moving surfaces, such as leaves or flowers blowing in the wind. Similarly, walking insects can display amazing speed, maneuverability, and robustness by rapidly sensing and avoiding predators, while foraging or seeking shelter in small spaces and unstructured terrains.

Silvia Ferrari, Sibley School of Mechanical and Aerospace Engineering, with Robert J. Wood (Harvard University), is working toward a future where autonomous, small-scale robots would have similar capabilities, sensing and responding to their environments and maneuvering without human commands. These robots would be particularly invaluable for surveillance or reconnaissance missions in dangerous or remote environments.

Agile maneuvers require fast sensors with high accuracy and low latency, which typically translates into more processing and battery power as well as greater weight. Ferrari and Wood are overcoming this bottleneck by developing integrated sensorimotor processing, planning, and control methods that would allow fully autonomous insect-inspired robots to carry out multiple tasks with speed and maneuverability, like their biological counterparts. Ferrari and Wood are developing event-based programming methods for: cost-effective and fast multimodal sensory integration and navigation; multiple, coordinated functionalities; and robust response to disturbances.

Robots at this scale have unique advantages, such as decreased cost, covertness, physical robustness, and access to unstructured and narrow spaces inaccessible to humans. By developing new and more effective sensorimotor architectures applicable at the gram or sub-gram scale, the project is making an important leap toward the fabrication of fully autonomous small-scale robots.

Source: Cornell University news release