Cracking the Flavour Code of Greenhouse Tomatoes

Imagine a ripe red juicy tomato bursting with flavour and now picture it growing in an Ontario greenhouse, soon to be delivered to your local grocery store. Too good to be true? Not according to Dr. David Liscombe, a Research Scientist in Biochemistry at Vineland Research and Innovation Centre (Vineland) who is working to put the science behind tomato flavour into practice.

To increase the sector's competitiveness, the Ontario Greenhouse Vegetable Growers (OGVG) identified the flavour improvement of Ontario greenhouse-grown tomatoes on the vine (TOV) as an important research priority. In 2012, Ontario was responsible for 66% of the total national greenhouse tomato production, with a farm gate value of approximately $258 million. Over 40% of total greenhouse tomato acreage in Ontario is dedicated to growing TOVs.

Using a multidisciplinary approach, project leader Dr. Liscombe and Vineland colleagues Dr. Amy Bowen (Consumer Insights), Dr. Valerio Primomo (Vegetable Breeding) and Travis Banks (Bioinformatics) are working to understand what makes a tomato flavourful.

"We are integrating the sensory drivers of consumer preference identified by our Consumer Insights team with the genetic and biochemical profiles of hundreds of different lines of tomatoes," says Liscombe. "We will select lines that bear the taste traits preferred by Canadian consumers and then transfer this trait into adapted tomato varieties for commercial production in Ontario greenhouses."

While the project is still in early stages, the team is already hard at work sequencing DNA of 285 genetically-diverse tomato varieties and measuring sugars, acids and volatile chemicals in 180 tomato varieties. These data will be analyzed and integrated to narrow down the selection to 50 varieties of tomatoes. The Consumer Insights team will evaluate for specific sensory (aroma/flavour, taste and texture) characteristics and consumer preference to develop a preference map for TOVs. Moreover, the breeding team is using marker-assisted selection to ensure the new, flavourful varieties possess disease resistance traits essential for production in Ontario.

Tomato flavour is governed by a complex mixture of sugars, organic acids and over 30 volatile chemicals that can influence flavour intensity and perception of sweetness. The composition of this flavour cocktail depends greatly on the genetics of the variety and is further influenced by growing conditions. It is important to identify consumer preference drivers on Ontario grown TOVs.

Vineland's industry-focused research creates impactful results for the Canadian greenhouse industry. For more information on this research program, please contact: Dr. David Liscombe, Research Scientist, Biochemistry at 905-562-0320 x826, david.liscombe@vinelandresearch.com.

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