Tastier Tomatoes in the Future?

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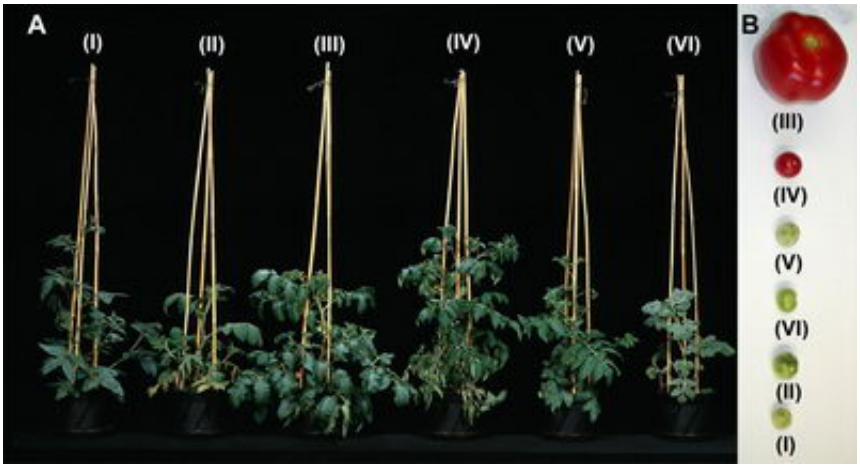

A) tomato plants and B) tomato fruits of the Solarum Lycopersicum complex, which are easily cross-bred with each other. Various wild tomatoes - (I) S. chmielewskii, (II) S. habrochaites, (IV) S. pimpinellifolium, (V) S. neorickii, (VI) S. pennellii - are all excellent for hybridisation with the cultured tomato (III) S. lycoperisicum. Image: Max Planck Institute of Molecular Plant Physiology

Tomatoes are good for you. They strengthen the immune system and can prevent heart and circulatory disease. Now, researchers from the Max Planck Institute of Molecular Plant Physiology, in co-operation with Israeli scientists, have identified DNA fragments in tomatoes that make their contents both healthy and tasty. The researchers crossed wild tomatoes with cultured ones, then investigated the contents and genetic make-up of the hybrid. The results could allow tomato growers to use wild tomatoes to produce cultured tomatoes with the characteristics they

desire.

Tomatoes are a major nutrient for humans. In 2004, 120,000 tonnes of tomatoes were harvested worldwide - and every year this number increases. Numerous medical studies have shown the health value of tomatoes. Lycopen, the pigment that makes tomatoes red, can for example prevent heart disease. Tomatoes furthermore contain a lot of vitamins C and E, indispensable for human nourishment. But after centuries of cultivation for shape, colour, and other useful qualities, our cultured tomatoes today are of small genetic diversity, in comparison with wild types. This has affected the taste and health value of the fruits.

To cultivate tomato strains with particular characteristics, researchers have to increase the genetic diversity of cultured tomatoes. This can be done either by cross-breeding them with wild tomatoes, or changing their genetic make-up technologically. Scientists from the Max Planck Institute for Molecular Plant Physiology in Golm, and their Israeli colleagues at Hebrew University in Jerusalem, chose the second option. They investigated strains of tomatoes created from the crossing of cultured and wild types. Their goal was to identify the biochemical composition of fruits and determine which factors control their development. The German-Israeli research team used a method of analysis developed at the Max Planck Institute for Molecular Plant Physiology. The technique - a combination of mass spectrometry and gas chromatography - analyzes the composition of biological samples. It can be used to quickly and simultaneously look into a fruit’s amino acids, organic acids, sugar and vitamins.

Dr. Alisdair Fernie, head of the Institute’s "Central Metabolism" research group, discovered that there were 880 variations in the content composition of descendants produced by crossing cultured tomatoes and wild tomatoes. "On one hand, we measured higher amounts of essential amino acids and vitamins, on the other hand the fruits showed an altered

combination of various sugars and organic acids," Fernie says. These contents have a great influence on the taste of tomatoes.

The scientists used molecular biological methods to identify parts of the tomato genomes responsible for biochemical changes. The researchers' findings could make it possible in the future to cross-breed wild tomatoes with cultured tomatoes in a targeted way to make them more nutritious.

Original work:

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Comprehensive metabolic profiling and phenotyping of interspecific introgression lines for tomato improvement
Nature biotechnology, March 12, 2006

Source: Max-Planck-Institute of Molecular Plant Physiology