

# Researchers discover genes that give vegetables their shape

November 12 2018, by J. Merritt Melancon

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The Tomato, (*Lycopersicon lycopersicum*) flowering, associated with a young, developing fruit. Credit: Earth100/Wikipedia

From elongated oblongs to near-perfect spheres, vegetables come in almost every size and shape. But what differentiates a fingerling potato

from a russet or a Roma tomato from a beefsteak? Researchers at the University of Georgia College of Agricultural and Environmental Sciences have recently found the genetic mechanism that controls the shape of our favorite fruits, vegetables and grains.

In article published Nov. 10 in the journal *Nature Communications*, Esther van der Knaap, professor of horticulture, and her team at UGA detail a set of genetic traits, shared by multiple [plants](#), that have been found to [control](#) the [fruit](#), leaf or seed shape in each.

"We may be able to explain the shapes of many fruits and vegetables through a similar mechanism to the one we described in tomatoes," van der Knaap said.

"We found that in tomatoes, plant cells in the fruit divide in a column or in a row and that will determine their shape. We also found that this mechanism is likely the same in several other plant species: melons, cucumbers, potatoes. We've even been able to go as far as finding that the same [mechanism](#) controls the shape of rice grains as well as leaves."

The discovery of the genetic pathways that control shape are important for plant breeders but the information is also crucial for a better understanding of plant evolution and development.

As part of a National Science Foundation and United States Department of Agriculture-funded projects, this paper expands on van der Knaap's previous work to locate the [genes](#) that account for the wide variety of tomato shapes and sizes.

In those studies, she found that the genetic sequences that control the shape and [size](#) of tomatoes do so by controlling cell division or cell size. Many of the genetic sequences are representing genes that each tell a small story about how the fruits form. Some of these genes affect the

size and shape of the fruit at the later stages of development, just before the fruit is ripening. Others affect the shape and size much earlier even before flowering.

In this study, by looking at the genetic mechanisms and genomes of other vegetables and fruits, van der Knaap's team was able to locate similar sets of genes in many other plants.

Potatoes and tomatoes are members of the Solanaceae family and these species are very closely related. Nearly all genes in these two genomes are collinear with one another. This often means that the same gene controls related traits in both species. With respect to tomato, the gene that controls [fruit shape](#) also controls potato tuber [shape](#) as it is found in the same location in the genome.

**More information:** Shan Wu et al. A common genetic mechanism underlies morphological diversity in fruits and other plant organs, *Nature Communications* (2018). [DOI: 10.1038/s41467-018-07216-8](https://doi.org/10.1038/s41467-018-07216-8)

Provided by University of Georgia

Citation: Researchers discover genes that give vegetables their shape (2018, November 12) retrieved 9 April 2024 from <https://phys.org/news/2018-11-genes-vegetables.html>

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