

Tomato domestication involved agricultural societies from Peru to Mexico

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The plants we eat have been domesticated. There are no wild chihuahuas, in the wilderness there are wolves and, likewise, there are no wild big and juicy tomatoes, bread wheat or popcorn maize in the wild.

Our forebears modified these species to adapt them to their needs, uses, and tastes. The tomato was domesticated by native American cultures thousands of years ago. Unfortunately, there are few tomato archeological remains and many questions to answer. Although some of these issues have been discussed for decades, most of them still have no final answers. For instance, it has been proposed that the domestication could have been carried out in Mesoamerica, the region comprising Mexico and Central America, or, alternatively, in Peru and Ecuador, but there has been no definitive evidence capable of settling the debate.

The plant genomic group at COMAV, a research institute located in the Universitat Politècnica de València in Spain, in collaboration with researchers from the University of Georgia are publishing in Horticulture Research new findings obtained within Varitome, a National Science Foundation funded project (NSF1564366). The whole genome of 628 wild and cultivated plants have been analyzed to unravel some details of the complex American tomato history.

Most of the contemporary cultivated tomato is very similar to the wild Mesoamerican plants (*Solanum lycopersicum* var. *cerasiforme*), however, in its domestication there were also involved wild Ecuadorian and Peruvian species (*S. pimpinellifolium*). This complex scenario has hampered the study of the tomato domestication for decades, but, thanks to a novel statistical analysis developed for this research, it was possible to find out that although the domestication process started with the Mesoamerican materials, it was quite complex. In a first step, Mesoamerican plants migrated southward to a region located between the Andes foot and the Amazonian forest in Peru and Ecuador. This humid region is known as Ceja de Montaña. This migration was fast and very likely due to the commercial relationships established between different Mesoamerican and Ecuadorian and Peruvian cultures. More recently, some plants, very similar to the ones still grown in Southern Ecuador and Northern Peru, migrated back to Mexico. Surprisingly, the

vintage Yucatan tomatoes are more similar to the Peruvian and Ecuadorian Ceja de Montaña ones than to its wild counterparts found in Mexico. Thus, it has been established that some wild tomatoes migrated southward and, then, went back as cultivated.

Moreover, these voyages would change the tomato forever. The growers from Ceja de Montaña did not use pure Mesoamerican plants, but admixtures created crossing the newly arrived plants with wild plants from coastal Peru and Ecuador. It is also there, in Southern Ecuador and Northern Peru, in the region located between Mayo and Chinchipe, where the highest genetic diversity of cultivated tomatoes in the world have been found, and it might be there where the domestication took place. However, to have a final confirmation regarding this question new archeological tomato remains could be needed.

The hybridization between Mesoamerican and Ecuadorial plants was used to take genes needed to adapt the northern tomatoes to the climate and latitude of Ecuador. Without this old hybridization it is unlikely that the tomato could have been easily adapted to climates as different as the Ecuadorian forests and the Mediterranean coasts.

The American tomato history was complex and included very distant agricultural cultures that adapted the crop to their needs and tastes. Like any other crop, the cultivated tomato was created by the genetic modifications fostered by its first growers. In the Americas the tomato was a secondary crop used mainly to prepare sauces. However, this was not the end of its trips, but only the beginning. For instance, after arriving in Europe different varieties were created, and it wasn't until the industrial revolution that the crop acquired its current relevance. Nowadays we are still creating new varieties adapted, again, to our needs, uses, and tastes. The native american growers defined the past of the tomato, and it is our shared task to define its future. We change the [plants](#) we grow, and they, in turn, define us.

More information: Jose Blanca et al, Haplotype analyses reveal novel insights into tomato history and domestication driven by long-distance migrations and latitudinal adaptations, *Horticulture Research* (2022).

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