

Increase of beta-carotene in corn improves human health

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(PhysOrg.com) -- A Michigan State University researcher is among a team of scientists that have uncovered the mechanism by which the amount of beta-carotene, or provitamin A, is increased in corn, a finding that can help combat vitamin A deficiency and improve human health in the developing world.

Dean Della Penna, a professor of microbiology and molecular genetics who is also affiliated with the Michigan Agricultural Experiment Station, was part of an international collaboration of scientists that published their findings of the rare [genetic variation](#) in the March 21 issue of the journal *Nature Genetics*.

“Understanding how naturally occurring mutations in genes that synthesize micronutrients function at the most basic, genetic level allows us to apply the knowledge and methods to develop corn varieties that will positively influence human health around the world,” Della Penna said.

Vitamin A is produced from provitamin A carotenoids in food, mainly plant-based foods. About 250 million children are at risk for [vitamin A deficiency](#) worldwide and between 250,000 and 500,000 children go blind from a lack of vitamin A each year. Boosting levels of provitamin A carotenoids in crops using naturally-occurring gene variants is one way to help solve these health problems.

Building on a decade of research, scientists now understand which genes

are required for plants to produce beta-carotene and are studying how naturally occurring variants of these genes can increase beta-carotene production at the cellular level.

Della Penna's MSU research team analyzed the protein activity of the natural genetic variants. Their work was combined with research by 20 other scientists from Purdue University, Iowa State University, Cornell University, University of Illinois, and others, including the U.S. Department of Agriculture and institutions in Mexico and China.

“One serving of this new corn provides 57 percent of the beta-carotene needed in a healthy diet,” Della Penna said. “The collaboration of all the scientists allowed us to use processes called association mapping and molecular-assisted breeding to increase the amount of [beta-carotene](#) from 0.5 micrograms per gram of [corn](#) to approximately 9 micrograms per gram.”

Della Penna is an authority on the biosynthesis of micronutrients in plants, conducting pioneering research on vitamin A and vitamin E biosynthesis and using biochemistry, genetics and genomics to discover and understand the plant enzymes used to make them.

The research was funded by the U.S. Agency for International Development, HarvestPlus, the National Science Foundation, the TRIAD Foundation, China National Science Foundation, China Scholarship Fund and the Jonathan Baldwin Turner Fellowship at the University of Illinois at Urbana-Champaign.

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Provided by Michigan State University

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