A new approach that saves eyesight and lives in the developing world

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Two Agricultural Research Service (ARS) scientists are part of an international team that has found a way to boost the nutritional value of corn. This has the potential to reduce the number of children in developing countries who lose their eyesight, become ill or die each year because of vitamin A deficiencies.

Corn contains carotenoids, some of which the body can convert to vitamin A. Beta-carotene is the best vitamin A precursor, but only a very small percentage of corn varieties have naturally high beta-carotene levels. In Africa and other developing regions, corn is a major staple and hundreds of thousands of children become blind, develop weakened immune systems and die because of diets based largely on corn that lacks sufficient beta-carotene.

Marilyn Warburton, a geneticist with the ARS Corn Host Plant Resistance Research Unit in Starkville, Miss.; Edward Buckler, a geneticist in the ARS Robert W. Holley Center for Agriculture and Health in Ithaca, N.Y., and their colleagues published results identifying genetic sequences linked to higher beta-carotene levels in corn and demonstrating an inexpensive and fast way to identify corn plants that will produce even higher levels. The report, recently published in Nature Genetics, is considered a breakthrough in nutritional plant breeding.

The project was funded in part by the National Science Foundation and included major scientific contributions from Torbert Rocheford of Purdue University and Jianbing Yan of the International Maize and

Wheat Improvement Center in Mexico.

In their study, the researchers surveyed the genetic sequences of corn from around the world through association mapping, a method made possible by recent breakthroughs that accelerate the genetic profiling of crops.

The genetic survey revealed natural variations in one gene sequence linked to higher beta-carotene levels. These variations interacted with a gene identified previously, and the best variations of the two genes together led to an 18-fold increase in beta-carotene, according to Warburton. The mapping survey identified molecular markers that breeders can use to incorporate the desired gene variants into corn for the developing world. Warburton and Yan are now working with breeders oversees to train them on use of the new techniques.

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