Key genes identified to up vitamin A in corn, good news for Africa

Purdue researchers have identified a set of genes that can be used to naturally boost the provitamin A content of corn kernels, a finding that could help combat vitamin A deficiency in developing countries and macular degeneration in the elderly.

Professor of agronomy Torbert Rocheford and fellow researchers found gene variations that can be selected to change nutritionally poor white corn into biofortified orange corn with high levels of provitamin A carotenoids – substances that the human body can convert into vitamin A. Vitamin A plays key roles in eye health and the immune system, as well as in the synthesis of certain hormones.

“This study gives us the genetic blueprint to quickly and cost-effectively convert white or yellow corn to orange corn that is rich in carotenoids – and we can do so using natural plant breeding methods, not transgenics,” said Rocheford, the Patterson Endowed Chair of Translational Genomics for Crop Improvement.

Vitamin A deficiency causes blindness in 250,000 to 500,000 children every year, half of whom die within a year of losing their eyesight, according to the World Health Organization. The problem most severely affects children in Sub-Saharan Africa, an area in which white corn, which has minimal amounts of provitamin A carotenoids, is a dietary mainstay.

Previous research by Rocheford and his colleagues identified two genes that contribute to provitamin A carotenoid levels in corn kernels, but “we wanted more cookies in the jar for breeders to pick from,” he said.

The researchers used a combination of statistical analysis and prediction models to identify and assess the potential usefulness of genes associated with carotenoid levels in corn. They evaluated data sets from about 200 genetically diverse lines of corn at varying scopes of investigation – from the entire corn genome to stretches of DNA surrounding small sets of genes. They uncovered four genes that had not previously been linked to carotenoid levels in corn kernels.

Though many genes likely contribute to carotenoid levels in corn, “we’re pretty confident that our previous and current research has now identified several genes that are the major players,” Rocheford said.

Their study found that a combination of visually selecting corn with darker orange kernels and using a number of these favorable genes could be an effective way to rapidly convert white and yellow corn varieties to orange corn with higher levels of provitamin A and total carotenoids.

Read full original article: Natural gene selection can produce orange corn rich in provitamin A for Africa, U.S.