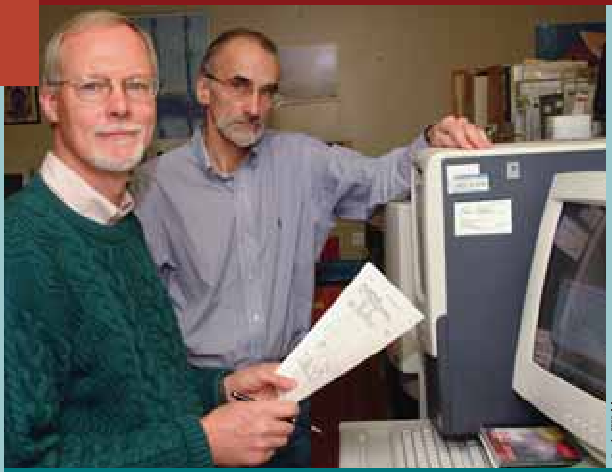
UF Researchers Closer To Folate-Enriched Crops



UF nutrition Professor Jess Gregory, left, and Eminent Scholar Andrew Hanson led a team of researchers in finding one of the genetic pathways to the production of folate in tomato plants. Hanson and Gregory say the finding brings scientists one step closer to developing folate-enriched crops to feed the developing world.

Josh Wickham

Two University of Florida researchers and their collaborators have found one of the genetic pathways to folate production in plants — research that could lead to crops rich with the birth defect-preventing nutrient to feed the developing world.

"This may be the best way to combat folate deficiency in some of the world's most underdeveloped countries, where the problem is most prevalent," said Jess Gregory, a professor at UF's Institute of Food and Agricultural Sciences.

Gregory and UF eminent scholar Andrew Hanson, working on a $382,000 grant from the National Science Foundation, led a team of researchers in finding a gene that is key to the production of p-aminobenzoate, a substance plants use to make folate, in tomatoes. Their team included researchers from the U.S. Department of Agriculture; the University of Illinois in Chicago; the Commissariat à l'Energie Atomique in Grenoble, France; and the RIKEN Genomics Center in Yokohama, Japan.

Their research, which was published in the online edition of *Proceedings of the National Academy of Sciences*, takes them a step closer to breeding or genetically engineering plants with higher levels of folate.

A form of vitamin B, folate is found in leafy green vegetables such as turnip greens or spinach, as well as peas, beans and fruit. Folate is particularly important during pregnancy and fetal development, and a deficiency can lead to spina bifida or other birth defects. Doctors have long advised women of childbearing age — pregnant or not — to take vitamin supplements containing folate. In 1998, concerns that Americans weren't getting enough of the nutrient led the U.S. Food and Drug Administration to require that cereal, bread and other grain products be fortified with folic acid, the synthetic version of the vitamin.

The problem is much more serious in developing countries, Gregory said. And in many of those countries, he said, it's difficult to make a vitamin-fortification program work.

"Typically in these countries, food processing and grain milling are done by a large number of small, local processing plants," Gregory said. "With such a decentralized food distribution system, it's hard to put in place a fortification program that can be monitored and controlled effectively."

In the past few decades, advances in genetic engineering have allowed scientists to focus on a new way to get vitamins into staple foods. Researchers can genetically alter certain crops to produce larger amounts of certain vitamins, he said.

This approach, known as biofortification, has already produced one well-known product. In the late 1990s, Swiss and German researchers announced the creation of "golden rice," genetically altered to contain higher-than-normal levels of beta-carotene, a nutrient that the human body can convert to vitamin A. Advocates say the crop can help the millions of people worldwide who suffer from vitamin A deficiency, which can cause blindness and even death.

Hanson and Gregory hope to create a plant that will do for folate what golden rice promises to do for vitamin A. But getting there won't be easy, the researchers say. That's because scientists have yet to identify all the genes responsible for the complex set of processes plants undergo while making the nutrient.

"Until you understand how this process works, you can't do engineering of the plants in a rational way," Hanson said.

The UF researchers chose to work with tomato plants because the leaves of the plant contain lots of folate, while the fruit — the part that makes its way to your salad bowl — is relatively low in the nutrient.

"We know that as the fruit of the plant ripens, there is a rapid drop in the expression of genes for folate synthesis," Hanson said. "Our goal is a fruit that continues to make a lot of folate as it ripens."

The UF researchers believe the tomato plant is a good choice because it is a part of the diet in cultures around the world — and because it is often consumed uncooked.

"Folate is very unstable, and a lot of it can be lost when food is cooked," said Hanson. "That's why we think it's a good idea to start with fruits and vegetables that aren't always cooked before they're eaten."

"Given the amount of interest in this in Europe, which is traditionally fairly hostile to genetically modified foods, I'd say there is definitely a market for folate-enriched products," Hanson said.

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