

ARS Vegetable Breeders On a Nutrition Mission

Eat your veggies! First it was Mom who implored us. Now multiple government agencies, each with its own nutrition researchers, are urging us to fortify our bodies and minds by heaping more colorful fruits and vegetables onto our dinner plates.

The pressure to eat healthy is certainly building. So you may find it heartening to know that Agricultural Research Service scientists, in laboratories and greenhouses across the country, are trying to make Americans' veggie-eating goals more easily achievable—and, yes, more enjoyable too.

One of their strategies? Breed vegetables with increased levels and types of nutrients in them. Take the carrot, for instance. Thanks to research done by ARS plant geneticist Philipp Simon, today's carrots naturally contain about twice the beta-carotene they did 25 years ago.

What other vegetables are destined to be famous for their brightly colored hues? Geneticist Jack Staub, an expert on squash, cucumbers, and related cucurbit species, is working with Simon in ARS's Vegetable Crops Unit at Madison, Wisconsin, to boost those crops' beta-carotene content.

And in Ithaca, New York, at the agency's Plant, Soil, and Nutrition Laboratory, geneticist Li Li is using cauliflower as a model for studying how orange-pigmented carotenoids accumulate in plants. Her research was recently highlighted in *Agricultural Research*. (See "Improving Crop Plants Through Genomics," January 2007, p. 8.)

By enhancing the beta-carotene content of popular veggies, the scientists hope they can help increase dietary opportunities for getting adequate vitamin A—not only for American consumers, but also for others across the globe.

In the developing world, this goal is especially important, since the World Health Organization estimates that 250 million children under the age of 5 suffer from vitamin A deficiency. This puts them at an increased risk for illness, blindness, and death.

Raymond Glahn, an ARS physiologist who also works at the Ithaca lab, is focused on improving a crop that's already widely eaten in western Africa: maize. With the help of the International Institute of Tropical Technology in Idadan, Nigeria, Glahn is upping maize's iron content. Iron deficiency anemia afflicts more than half the children and over 60 percent of childbearing-age women in Nigeria alone. (See "Pumping Iron Into Western Africa's Corn," *Agricultural Research*, April 2003, p. 14.)

ARS molecular biologist Edgar Cahoon at the Donald Danforth Plant Science Center in St. Louis, Missouri, is part of a team of researchers looking to make over another African staple—cassava. The team, led by Ohio State University in Columbus, is aiming to boost the root's nutrients, especially its beta-carotene and vitamin E content.

Aware that global nutritional deficits know no borders, Simon and University of Wisconsin collaborator Sherry Tanumihardjo are acting locally, in their home state of Wisconsin, to spread seeds of change. Working with the U.S. Department of Agriculture's Women, Infants, and Children nutrition program, they're recruiting youths from Wisconsin's inner cities and American Indian reservations to participate in sensory evaluations of colorful carrots. The children, some of whom have never before tasted a carrot, are being asked to comment on the roots' flavor and texture. And thanks to seed packets donated by Simon, they're also getting to experience what it's like to grow their own carrot plants.

Taste and consumer acceptance are a critical part of many ARS vegetable- and fruit-breeding programs. Geneticist Shelley Jansky, as detailed in a story beginning on page 4 of this issue, is conducting sensory studies to see how consumers respond to baked potatoes that differ in variety and in how and where they were grown.

Finally, vital to any vegetable-improvement effort is knowledge of a crop plant's origins, global distribution, and relationships with "cousin" crops. How can we develop new, nutrient-dense crops without a full grasp of the exotic, yet-to-be-discovered DNA that's sprouting, unseen and unused, somewhere out there?

To help answer that question, ARS scientists are digging deep—into faraway soils and plant genomes—in search of new varieties that offer unprecedented color, nutritional qualities, tastes, and textures. Consider, for instance, two of our most popular vegetables: the tomato and the potato. These two plants, as noted on page 7 of this issue, belong to the family Solanaceae. When it comes to documenting, charting, and organizing this plant group—which also includes eggplant, chili pepper, and nightshade—we've just begun to scratch the surface.

One scientist who's trying to expand this crucial knowledge base is Madison, Wisconsin, botanist David Spooner. With the support of a \$4.3 million grant awarded by the National Science Foundation, Spooner and three colleagues will spend several months this year trekking through South America in search of new Solanaceae species.

With our nutritional welfare and taste buds in mind, let's hope they uncover several new botanical gems.

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