GENETICIST AMNON LEVI

NOTES FROM A FARM: USDA'S VEGETABLE LABORATORY

Veggie Heroes

By Helen Mitternight

Imagine a Southern table without collards redolent of smoky pork, without the taste of a sweet, crisp watermelon, or sans a slice of sweet potato pie for dessert.

Marvel has its agents of SHIELD; vegetables have a small crew of scientists in Charleston, South Carolina, who geek out about things like germplasms. And, just like the Avengers have their mansion, the vegetable superheroes have their own headquarters.

About a half an hour away from the most prestigious restaurants in downtown Charleston, past a suburban stretch of car dealerships, the USDA's Agriculture Research Service Vegetable Laboratory sits on 450 acres of farmland. Inside, a group of fourteen scientists—nine federal and five from Clemson University—work patiently on developing vegetables that can save the Southern table and, just maybe, the world.

The wide brick building is one of ninety such labs across the country. Each focuses on at least one topic—from aquatic animal health to cotton fibers, from honeybees to peanuts—but the Charleston lab is primarily vegetables, and the occasional fruit, including three gems of Southern kitchens: collards, sweet potatoes, and watermelon. Without this lab's work, and others like it, it's entirely possible that much of the produce that we hold dear would fall victim to weather, insects, or neglect.

GENETICIST PHILLIP WADL IN THE LAB

One such rescue mission took place more than ten years ago. Mark Farnham, supervisory research geneticist, knew that little old ladies who boasted a yard of big, beautiful collards were likely to save the seeds from their crop to use the next year. These seeds went far beyond the standard Top Bunch or Blue Max. They produced an astounding variety of leaves. There was value to these heirloom seeds being carefully hoarded by backyard gardeners in the Carolinas. The problem was, many of these folks were… old. "We could document that some of these people's grandparents grew [collards]," Farnham says. "A lot of people saving seeds were in their 70s and 80s, and there appeared to be no one readily able to perpetuate after them. We were losing gardeners." And losing gardeners meant losing the precious seeds.

Farnham and some colleagues from Emory and Henry College in Virginia and Clemson University began a lengthy process of chatting up these farmers and convincing them to part with some of their seeds. The result, Farnham says, is now a stash of eighty to ninety unique collard seed samples that the USDA saves in its genetic bank and uses to try and improve the mass-produced collards most of us cook with, by breeding them with the heirlooms. "These plants are the front line of defense against plant diseases," Farnham says. "If we're looking for resistance, it's the first place we go."

PHOTOS BY LESLIE RYANN MCKELLAR

The hardy collards can help not just other collard varieties, but broccoli, cauliflower, cabbage, kale, and other vegetables so closely related to them that they can be interbred. It can take five years to develop a line of collards that can be crossed with something more conventional to create a stronger hybrid, and sometimes, a disease will be a step ahead of the hybrid. Leaf blight, for instance. "We're trying to find the Holy Grail, something that is resistant to all of it," says Phillip Wadl, a research geneticist who is trying to develop a sweet potato resistant to diseases and insects but still tastes good and produces high yields.

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Sweet potatoes can fall victim to pests such as wireworms, flea beetles, grubs, and weevils. Depending on the season, around 5 acres of the lab's 450, are dedicated to sweet potatoes. About 10,000 seedlings are grown for 100 days and then only 2.5 percent make it to the next level to be analyzed for shape, flesh color, and resistance. The ones that don't stand up to the trials are discarded. The sweet potato presents a challenge other vegetables do not: while collards have only two pairs of chromosomes, sweet potatoes have six, which means that, just when Wadl thinks he's found one bug-resistant strain, a new "hybridization event" creates new genetic combinations that can fall prey to other bugs. It sounds like a genetic Whack-A-Mole. "It can be challenging," Wadl admits.

WADL IN THE FIELD

Although watermelons are not as genetically complex as sweet potatoes, growing them in the South presents its own problems for Amnon Levi, a senior research geneticist. "Watermelons come from the desert," he says. "The roots go very deep when they germinate—like two or three yards down—and they bring water up to the watermelon. People eat the watermelon and at the same time, spread the seeds. Watermelon and people have co-evolved." While there seem to be many varieties of watermelon, Levi says they actually have a "narrow genetic base," which means they all come from the same few parent watermelon vines. "It's the founder effect," he says. "You find a breed you like because you like the taste, and you do deep breeding with that type. Maybe you make them sweeter. But you also make them more prone to diseases."

COLLARDS

Watermelons can fall prey to soil-borne diseases and viruses transmitted by white flies and aphids. Levi oversees about fourteen or fifteen two-to-three-acre fields of watermelons and he has been working to improve watermelon health since 1998.

Of course, flourishing plants don't mean a thing if they don't taste good. Part of what the USDA is working on is vegetables that taste good, although taste is a whimsical thing that doesn't seem to fit into this world of grafting and data.

"We have a tasting panel (for the sweet potatoes)," Wadl says. "We bake the roots and we look at color, texture, sweetness." He says that there are several rounds of tasting because, "just because one tastes bad, it doesn't mean another [from the same gene pool] will, because taste is so complex."

How a vegetable looks and how it tastes is all well and good for the foodie, but the implications are broader if these Southern staples disappear. These vegetable heroes are working on saving lives as well with amped-up nutrients. Orange sweet potatoes provide beta-carotene, the precursor to Vitamin A; watermelon offers lycopene and antidioxidents; and several collards have glucoraphanin that breaks down into a compound that may detoxify and decrease the incidence of cancer. These scientists dedicate their whole careers to saving vegetables that can save us. And they don't even wear capes.