

Future of biofortified foods: Protests block advancement of super bananas and Golden Rice

Say you live in a developing country where adequate and nutritious food is sparse.

Say the [children in your community were going blind or dying](#) from a manageable condition like vitamin A deficiency.

What if someone told you they'd bred a version of a region's staple crop is rich in the nutrients a young body needs to produce vitamin A?

You'd be thrilled, right? Well, what if it wasn't *bred*, but genetically engineered instead? What if the potentially life-saving fruit was a GMO?

These questions are more than just hypotheticals. These crops exist, and scientists have been developing them for years. But have been blocked by activists who judge the plants, not by their potential or the science behind them, but by the way they were made.

One such crop is the 'super banana,' which was engineered by the Queensland University of Technology and funded by \$10 million from the Bill and Melinda Gates Foundation. The hope is that this banana can help alleviate vitamin A deficiency in places like Uganda where an estimated 52 percent of children under 5 are vitamin A deficient.

Despite the immense promise of these bananas, many roadblocks have held them up from reaching the people who need them. In the winter of 2014, the bananas were sent to Iowa State University for testing on humans—researchers needed to know if the nutrient is bio-available in sufficient quantities to be effective in treating vitamin A deficiency.

It's been waylaid there ever since because of protests. In February of 2016, a petition with 57,000 online signatures was delivered to the Bill and Melinda Gates Foundation demanding that the study cease. Despite this, ISU researcher Wendy White, who is leading the study, says research there on the fruit will finally be conducted at some point in 2016.

It's been a similar story for 'Golden Rice,' another staple crop genetically engineered to combat vitamin A deficiency. (It gets its name from the sunny hue lent to the rice by the [beta-carotene](#) present in the grains; beta-carotene is what your body processes to create vitamin A. The flesh of the 'super bananas' is a bit more orange than the typical pale yellow for the same reason.)

The idea for Golden Rice was born in 1984 at a meeting between the Rockefeller Foundation and the International Rice Research Institute (IRRI) in the Philippines. In informal conversation, the gathered scientists asked each other: What if you could insert any gene into rice? Charles spoke to Gary Toenniessen, then-head of the Rockefeller Foundation's biotech program, about the conversation. Most of the scientists mentioned genes for drought or disease resistance, but ...

They came to a breeder named Peter Jennings, a legendary figure in these circles. He'd created perhaps the most famous variety of rice in history, called [IR 8](#), which launched the so-called Green Revolution in rice-growing countries of Asia in the 1960s.

"Yellow endosperm," said Jennings. (The endosperm of a grain of rice or wheat is the main part that's eaten.)

"That kind of took everybody by surprise. It certainly took me by surprise. So I said, 'Why?' " Toenniessen recalls.

Jennings explained that the color yellow signals the presence of beta-carotene — the source of vitamin A. Yellow kinds of corn or sorghum exist naturally, and for years, Jennings said, he had been looking for similar varieties of rice. Regular white rice doesn't provide this vital nutrient, and it's a big problem.

"When children are weaned, they're often weaned on a rice gruel. And if they don't get any beta-carotene or vitamin A during that period, they can be harmed for the rest of their lives," says Toenniessen.

The current iteration of golden rice can [supply](#) 60 percent of a child's daily requirement of vitamin A. A success? Not quite yet. But it is progress as that's more than previous iterations of the crop.

Aside from some technical challenges, one of the major holdups has been well as protests from activist groups like Greenpeace, which have held back the development of the life-saving crop. Activists have gone so far as to vandalize fields where tests of the rice were being conducted. Greenpeace's actions have attracted the scorn of many prominent scientific leaders. For example, on June 30, 2016, 107 Nobel laureates signed a petition pleading with activists to stop blocking the crop's development and for world leaders to aid its development.

The counter-arguments come in two broad groups: the insistence that golden rice simply doesn't work—or worse, is dangerous to people and the environment by being genetically modified.

After a [study](#) was published in 2009 affirming the findings that the beta-carotene in golden rice is easily absorbed by the body, there were immediate cries of "[scandal](#)." This study gets filed away as "false"—ignoring the fact that the "scandalous" part of the research had to do with whether or not the researchers were explicit about the food tests involving GMOs and had no effect on the validity of the actual findings. Before and since there have been numerous studies affirming the safety and

overwhelming health benefits of Golden Rice, but those conclusions are often overshadowed by the ‘scandal.’

The other broad category of complaints is a toxic stew of distrust and fear regarding agricultural biotechnology. Many NGOs claim it’s [little more than a PR stunt](#) “being promoted in order to salvage a morally as well as financially bankrupt agricultural biotech industry.”

There are legitimate questions to be asked about the wishes of the communities where this rice will be grown or eaten, about alternatives (e.g. alternate crops naturally rich in beta-carotene; there are no viable ones in areas in which rice is the main staple), about the best approach to solving what everyone agrees is an awful problem.

But the people behind golden rice and the super banana are not charlatans. They’re funded by humanitarian organizations— the Rockefeller Foundation and the Bill and Melinda Gates Foundation, respectively. Humanitarian organizations founded by some of the most successful capitalists of all time, yes, but humanitarian all the same. It’s not actually Big Bad Monsanto funding these projects. All of the technology developed by corporations has been donated and are free of patents, so poor farmers will be able to exploit this technology and millions, perhaps billions, of people, can benefit. And even if hardened cynics are right and Bill Gates is simply throwing money at malaria and golden rice as ethical stunts to cleanse his capitalism-tainted soul, so what? Would we rather he not give any money to humanitarian causes? This project should be judged on its own merits.

So far the opposition to Golden Rice has proven itself too blinded by its own ideological prejudices to recognize a good-faith effort by researchers, scientists and plant breeders who are trying—with the tools and expertise they have—to help.

James Dale, a biochemist at Queensland University of Technology and leader of the ‘super banana’ project, expressed the altruistic goals of his team’s endeavor in an [interview](#) with the news agency AFP. “Good science can make a massive difference here by enriching staple crops such as Ugandan bananas with pro-vitamin A and providing poor and subsistence-farming populations with nutritionally rewarding food,” he said.

Golden rice, super bananas, and GMOs generally are no panacea for the global problems of malnutrition and hunger. Even Kevin Folta, a plant geneticist at the University of Florida and all-around champion of agricultural biotech knows this. The promise that GMOs will “end world hunger” is an oversimplification that distracts from the real potential of genetically modified foods. The highlight of his recent piece in SupplySide Boardroom—titled “[GMOs: Failing to Feed a Hungry World](#),”—is biofortification (i.e. the nutrition-enhancing process used to develop the rice and bananas we’ve been talking about). He paints a depressing picture:

Simple biofortification may have profound effects on third-world human health and, in many cases, may even extend benefits to livestock, adding more depth and richness to diets, as well as profitability to farms. Yet these proven technologies remain only as testimonials in

biotechnological innovation confined to the pages of journals with no hope of immediate application.

Famed Princeton bioethicist Peter Singer, who literally [wrote the book](#) on the animal rights movement and insists that it is a [moral imperative](#) that developed countries give more to help impoverished nations, has been [supportive of golden rice](#) and a case-by-case evaluation process for GMOs.

The awful truth is, while we sit here debating how best to proceed, children are still dying and going blind. Super bananas and Golden Rice have run into the same wall of obstructionism-masquerading-as-environmentalism. Mine is not a new conclusion, but that makes it no less vital: if we're going to address the very real, very complicated problems of global poverty and malnutrition, we must be willing to use every available tool. We must be willing to work together.

Kenrick Vezina is a freelance science writer, educator, and naturalist based in the Greater Boston area.