

# The New (Sneaky) GMO 2.0 Rush

What Could Go Wrong?  
What You Should Know.

BY STACY MALKAN

Are genetically engineered foods the solution for feeding a world crowded with 9 billion people? The chemical companies really want you to think so. Their propaganda machines are hard at work spinning tales that high-tech foods of the future will feed the hungry, cure the blind, and deliver us from climate change.

This hopeful vision blooms across the mainstream media and in classrooms with hardly a serious question in reply. A recent tweet tagged to the chemical industry's PR website @GMOAnswers celebrates "6<sup>th</sup> grade students brainstorming big biotech ideas to #Feedthe9." Student ideas included "breed carrots to have more vitamins" and "corn that will grow in harsh winter conditions." It all sounds so promising until you take a closer look at the realities behind the rhetoric.

For starters, in a country that already leads the world in production of genetically modified organisms (GMOs), millions go hungry. Reducing food waste, not GMOs, is the key to world food security, according to experts at the United Nations. And, although they have been on the market for more than 20 years, most GMO foods are engineered to survive pesticide spraying, (meaning that they arrive at the grocery store having been thoroughly doused with chemicals), and have no consumer benefits—despite decades of hyped-up promises for higher nutrients and heartier crops.

Vitamin-A-enhanced golden rice, for example—"the rice that could save a million kids a year," according to a *Time* magazine cover 17 years ago—has failed to reach the market despite millions spent on development. "If golden rice is such a panacea, why does it flour-

ish only in headlines, far from the farm fields where it's intended to grow?" asked Tom Philpott in *Mother Jones*. "The short answer is that the plant breeders have yet to concoct varieties of it that work as well in the field as existing rice strains. . . .When you tweak one thing in a genome, such as giving rice the ability to generate beta-carotene, you risk changing other things, like its speed of growth."

In other words, nature is complex and genetic engineering can produce unexpected results. Consider the case of the Impossible Burger. The plant-based burger that "bleeds" is made possible by genetically engineering yeast to resemble leghemoglobin, a substance found in the roots of soybean plants. The GMO soy leghemoglobin breaks down into a protein called "heme," which gives the burger meat-like qualities—its blood-red color and sizzle on the grill—without the environmental and ethical impacts of meat production. But the modified soy leghemoglobin also breaks down into 46 other proteins that have not been in the human diet before and could pose safety risks.

As a *New York Times* headline described the situation, "Impossible Burger's 'Secret Sauce' Highlights the Challenges of Food Tech." The story was based on documents obtained by ETC Group and Friends of the Earth under a Freedom of Information request—documents the company probably hoped would never see the light of day. When Impossible Foods asked the Food and Drug Administration to confirm its GMO ingredient was "generally recognized

as safe" (GRAS), the *Times* reported the agency instead "expressed concern that it has never been consumed by humans and may be an allergen."

FDA officials wrote in a 2015 memo, "FDA believes the arguments presented, individually and collectively, do not establish the safety of soy leghemoglobin for consumption, nor do they point to a general recognition of safety." But as the *Times* story explained, the FDA did not say the GMO heme was unsafe, and the company did not need the approval of FDA to sell its burger anyway.

So Impossible Burger is on the market with the company's assurances of safety, and most consumers are in the dark about what's in it. While the GMO process is explained on the website, it is not marketed that way at the point of sale. On a recent visit to a Bay Area restaurant that sells the Impossible Burger, a customer asked if the burger was genetically modified. He was inaccurately told no.

Lack of government oversight, unknown health risks, unintended consequences, and consumers left in the dark—these are recurring themes in the unfolding narrative about the Wild West of genetic engineering experimentation that is galloping toward a store near you.

## A GMO by Any Other Name . . .

Synthetic biology, CRISPR, gene editing, gene silencing: These terms describe the new iteration of genetically engineered crops, food



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animals, and ingredients that companies are sneaking into products as fast as they can get away with it.

The old method of genetic engineering, called transgenics, involves transferring genes from one species to another (or within a species). With the new genetic engineering methods—what some environmental groups call GMOs 2.0—companies are tampering with nature in new and possibly riskier ways. They can delete genes, turn genes on or off, or even create whole new DNA sequences on a computer. All these new techniques are GMOs in the way consumers and the U.S. Patent Office consider them to be—DNA is altered in labs in ways that can't occur in nature, and used to make products that can be patented.

### There are a few basic types of GMOs 2.0

**1. Synthetic biology GMOs** involve changing or creating DNA to artificially synthesize compounds rather than extract them from natural sources. Examples include genetically engineering yeast or algae to create flavors such as vanillin, stevia, and citrus, or fragrances like patchouli, rose oil, and clearwood—all of which may already be in products.

Some companies are touting lab-grown ingredients as a solution for sustainability. But the devil is in the details that companies are not disclosing. What are the feedstocks? Some synthetic biology products depend on sugar from chemical-intensive monocultures or other polluting feedstocks such as fracked gas. There are also concerns that engineered algae could escape into the environment and become living pollution.

And what is the impact on farmers who depend on sustainably grown crops? Farmers around the world are worried that lab-grown substitutes, falsely marketed as “natural,” could put them out of business. For generations, farmers in Mexico, Madagascar, Africa, and Paraguay have cultivated natural and organic vanilla, shea butter, stevia. In Haiti, farming vetiver grass for perfume oil supports up to 60,000 small growers, helping to bolster an economy ravaged by earthquakes and storms. Does it make sense to move this economic engine to South San Francisco and feed factory-farmed sugar to yeast to make cheaper vetiver? Who will benefit, and who will lose out, in the high-tech crop revolution?

**2. Genetically engineered fish and animals:** Dehorned cattle, naturally castrated pigs, and chicken eggs engineered to contain a pharma-

ceutical agent are all in the genetic experimentation pipeline. An all-male “terminator cattle” project—with the code name “Boys Only”—aims to create a bull that will father only male offspring, thereby “skewing the odds toward maleness and making the (meat) industry more efficient,” reported *MIT Technology Review*.

### What could go wrong?

The only GMO animal on the market so far is the AquaAdvantage salmon, engineered with the genes of an eel, via transgenics, to grow faster. The fish is already being sold in Canada, but the company won't say where, and US sales are held up due to “labeling complications.” The urge for secrecy makes sense from a sales perspective: Seventy-five percent of respondents in a 2013 *New York Times* poll said they

exactly where the apples are landing, but they won't be labeled GMO.

**Gene editing techniques** such as CRISPR, TALEN, or zinc fingered nucleases are used to cut DNA to make small genetic changes or insert genetic material. These methods are faster and more precise than the old transgenic methods. But the lack of government oversight raises concerns. “There can still be off-target and unintended effects,” explains Michael Hansen, PhD, senior scientist of Consumers Union. “When you alter the genetics of living things they don't always behave as you expect. This is why it's crucial to thoroughly study health and environmental impacts, but these studies aren't required.”

A non-browning CRISPR mushroom “escapes US regulation,” as *Nature* reported in 2016. A new CRISPR canola oil, engineered



would not eat GMO fish, and about two-thirds said they would not eat meat that had been genetically modified.

**Gene silencing techniques** such as RNA interference (RNAi) can turn genes off to create particular traits. The non-browning Arctic Apple was engineered with RNAi to turn down the expression of genes that cause apples to turn brown and mushy. As the company explains on its website, “When the apple is bitten, sliced, or otherwise bruised . . . no yucky brown apple left behind.” Are consumers actually asking for this trait? Ready or not, here it comes. The first GMO Arctic Apple, a Golden Delicious, began heading for test markets in the Midwest last month. Nobody is saying

to tolerate herbicides, is in stores now and may even be called “non-GMO,” according to *Bloomberg*, since the US Department of Agriculture has “taken a pass” on regulating CRISPR crops. The story noted that Monsanto, DuPont, and Dow Chemical have “stepped through the regulatory void” and struck licensing deals to use the gene-editing technology.

And that raises another red flag with the narrative that new GMOs will provide consumer benefits that the old transgenic methods didn't. “Just because the techniques are different doesn't mean the traits will be,” Dr. Hansen pointed out. “The old method of genetic engineering was used mostly to make plants resist herbicides and increase sales of

herbicides. The new gene editing techniques will probably be used in much the same way, but there are some new twists.”

### Corporate Greed Versus Consumer Needs

The world’s largest agrichemical companies own a majority of the world’s seeds and pesticides, and they are consolidating power in the hands of just three multinational corporations. Bayer and Monsanto are closing in on a merger, ChemChina has acquired Syngenta, and DowDuPont Pioneer just announced it is spinning out a new stand-alone ag business called Corteva Agriscience, based on a combination of words meaning “heart” and “nature.” But no matter what re-branding tricks they try, these corporations have a nature we already know—they all have long, sordid histories of hiding the health risks of dangerous products and leaving behind toxic messes: dioxin, Bhopal, teflon, PCBs, napalm, Agent Orange, chlorpyrifos, atrazine, dicamba . . . to name just a few scandals.

The future of high-tech food, under the stewardship of agribusiness and chemical corporations, is not hard to guess: more of what they are already trying to sell us – more types of crops genetically engineered to survive pesticides and drive up pesticide sales, and food animals engineered to grow faster and fit better in confined conditions, with pharmaceuticals to help.

It’s a great vision for the future of corporate profits and concentration of wealth and power, but not so great for farmers, the environment, or consumers who are demanding a different food future. Growing numbers of consumers want real, natural food and products. They want to know what’s in their food, how it is being produced, and where it’s coming from. For those who want to be in the know about what they are eating, there is thankfully still a sure-fire way to avoid old and new GMOs—buy and source organic. The Non-GMO Project verified certification also ensures products are not genetically engineered or made with synthetic biology.

It will be important for the natural foods industry to hold the line on the integrity of these certifications against the wild stampede of new GMOs. 🐾

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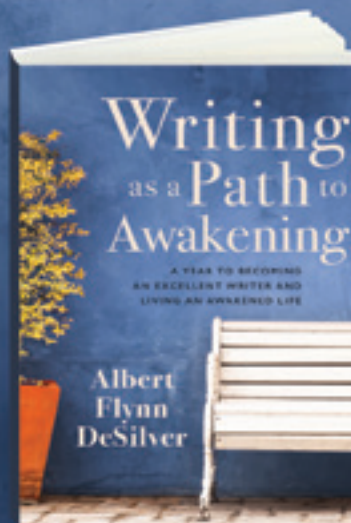
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