Viewpoint: Here’s how genetically engineered fruits and vegetables will soon emerge as a grocery store ‘selling point rather than a scare tactic’

Fruits and veggies are nature’s gift to humanity. Chock full of vitamins, delicious and colorful, they deserve a starring role in our diets. But some things tend to get in our way, like seasonality, cost, availability, and inconsistent or off-putting flavor. When we’re also surrounded by cheap, delicious, and ubiquitous processed foods, it’s all too easy to reach for the chips instead of the cherries.

But now, thanks to new genomic techniques, we’re starting to see a wave of bioengineered produce that enhance the nutritional value or accessibility of the original varieties. To name a few examples: there’s the Norfolk purple tomato in the U.S., which incorporates two genes from snapdragons to increase production of anthocyanin in the tomato, a rich source of antioxidants. There’s the high-GABA tomato in Japan, which uses CRISPR to quadruple the level of that amino acid, which can help lower blood pressure. There’s the Arctic Apple, which uses RNAi to knock out the apples’ own gene that causes it to brown when bruised or sliced. These sliced apples have an extended shelf life of 28 days and result in reduced food waste. And there’s the CRISPR’d salad mix that removes the wasabi-like flavor from mustard greens, which have double the nutritional value of romaine lettuce.

“If you look five years into the future as the gene editing market expands, there should be hundreds and hundreds of products by that point,” says Jon Entine, executive director of the non-profit Genetic Literacy Project, which focuses on biotech in medicine and agriculture. “You might even see sections of grocery stores that highlight this in a positive way.”

Genetically engineered foods as a selling point rather than a scare tactic would be a welcome and remarkable shift for a culture that has erroneously demonized it for years, going back to Golden Rice.

A decades-long odyssey

One of the original products that set out to improve people’s health through bioengineering was Golden Rice. In the late 1990s, several European scientists discovered how to genetically modify rice to produce beta carotene, which the human body converts to Vitamin A, an essential nutrient that is missing in the diets of many people in lower-income countries.

Golden Rice “has potential, if adopted widely, to reverse vitamin A deficiency, which affects 125 million children worldwide,” says Adrian Dubock, executive secretary and member of the Golden Rice Humanitarian Board. According to the WHO, an estimated 250,000 to 500,000 who are vitamin A-deficient become blind each year, and half die within a year of going blind. “If you can get something into staple food especially at no cost and with no detriment, this can really make a big difference.”

Yet the rollout of Golden Rice was notoriously hampered by anti-GMO activists like Greenpeace, who protested the use of the technology on false grounds, claiming that only natural foods are safe. They even broke through fences to destroy test crops. In fact, The World Health Organization, National Academy of Sciences, and other major science organizations, including the FDA, have found no evidence of harm posed by genetically engineered foods on the market, and have deemed them as safe as conventional foods.

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Credit: Greenpeace

Finally in 2021, more than two decades after its development started, the first country in the world approved the use of Golden Rice: the Philippines. They harvested 100 tons of the first Golden Rice

planted there last year, and more is planned for this year. In addition, they are field testing biofortified high iron and high zinc rice in combination with Golden Rice, to be produced at the same price as white rice. The reception in the country has been “extremely good,” so far, according to Dubock. “But it’s only one country so that’s a disappointment to the inventors and myself, having worked assiduously for so long. There’s no doubt that the reason for it is absolutely the GMO concerns and suspicions raised by Greenpeace.”

Perhaps now the tide is finally turning.

Changing market dynamics

Hostile attitudes in the 1990s in the U.S. and Europe toward GMOs, which are engineered by adding helpful genes to a seed, set the stage for a long fight for consumer acceptance.

The first wave of products mainly benefited farmers, such as Bt corn, a GMO corn that is the nutritional equivalent of regular corn and prevents insect and mold damage. Most of the corn and soy grown in the U.S. is GMO. It takes around 7-10 years and roughly $120 million to get a new trait approved, so large companies like Monsanto (which was acquired by Bayer in 2018) focused on high-volume traits in products like corn, soy and cotton.

“It’s been said that the reason the public has not embraced GMO crops is because most of the original traits were developed to benefit farmers,” Entine says. “But I think that’s a false argument as to why the public didn’t accept it. It was campaigns by so-called environmental groups that tried to make the case that genetically modified crops were somehow aberrational, that people could react in an adverse way. That was never true. They were attacking the fact that large corporations were developing these products, but they created the mess they complained about, and lobbied for very high restrictions so only big companies could afford to develop them.”

Now, the new products can be developed relatively inexpensively as newer methods like gene editing have come into play. For example, Entine points to a non-browning mushroom developed by Penn State for $45,000.

This opens the door for competition by smaller entities like startups and in narrower markets, like nutritional enhancement. Gene editing also speeds up timelines by tweaking precise genes to achieve a desired outcome.

Pairwise, a company that has received an investment from Leaps, developed the mild-tasting leafy greens and is now developing pitless cherries and seedless berries. Making dramatic improvements to tree crops like cherry can be difficult because of the long time it takes to conventionally breed woody tree species. Pairwise estimates that if you tried to make a pitless cherry with conventional breeding it would probably take a century, but with gene editing it could be possible in less than ten years. That’s why companies like Pairwise and Okanagan Specialty Fruits are applying the tools of genome editing to improve fruit tree crops with agronomic and consumer traits alike.

People becoming more open-minded

The reception has been positive for these early products. The reaction to the Pairwise salad mix was “way off the charts,” in a good way, Entine says. And the Arctic Apple has likewise been well received by consumers for half a decade since it came out commercially in 2019. There are now three apples that have the non-browning trait – Arctic Granny, Arctic Goldens, and Arctic Fujis. Non-browning Arctic Galas are coming in 2026.

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Credit: Arctic Apple

“We know from a number of independent studies that today’s consumers, especially GenZ and millennial consumers, are more open to food and technology. Especially if it aligns with their values around personal nutrition or sustainability,” says Sarah Evanega, Vice President for External Relations at Okanagan Specialty Fruits. “The consumer-focused traits coming forward today align with these values.”

Media trends are also consistent with these consumer studies. One study of media attitudes published in 2022 concluded, “Our results suggest that both social and traditional media may be moving toward a more favorable and less polarized conversation on ag biotech overall.”

Not only consumers, but also regulators and governments are starting to recognize that these technologies are essential for growing the food of the future. In Europe, the long-held strict stance against

new genomic techniques is loosening. In the U.S., gene-edited crops are held to the same standards as conventional foods since they do not incorporate any “foreign” DNA, as some traditional GMOs do, so no additional scrutiny is required. In other words, the regulatory bar is lower because edited crops could have occurred via conventional breeding. In Africa, Nigeria and Kenya are taking the lead on developing new products, and at least seven African countries have liberalized their regulations toward GMOs in recent years, with gene editing right behind.

“From a regulatory perspective things are looking more positive,” Evanega says. “The innovation landscape is much more diversified now than it used to be, in terms of products and product developers. And now the tools of gene editing should, in a good policy and regulatory environment, allow us to innovate much faster, especially in highly nutritious specialty crops.”

In the near-future, I can imagine going to my local grocery store and finding varieties of healthy and delicious fruits and veggies that I never could have dreamed of growing up. I hope the time is finally “ripe” for us to embrace them.

Juergen Eckhardt is a medical doctor and venture investor in healthcare, biotech, and agriculture with more than 20 years of experience. In 2016, he joined Bayer to help start Leaps by Bayer, the impact investment unit focused on investments in breakthrough technologies in health and agriculture. In September 2023, he became Head of Pharma Business Development, Licensing & Open Innovation and a Member of the Executive Committee of Bayer Pharmaceuticals.