



From Bitter Greens to Sweet Genes: The Future of Food

Pashupathi M.¹ and Rashmi Mishra²

¹Department of Veterinary
Physiology & Biochemistry,
CoVAS, Rani Lakshmi Bai
Central Agricultural University,
Jhansi

²Department of Veterinary
Parasitology, ICAR-Indian
Veterinary Research Institute,
Izatnagar, Bareilly



Open Access

Article History

Received: 01. 05.2025

Revised: 05. 05.2025

Accepted: 10. 05.2025

This article is published under the
terms of the [Creative Commons
Attribution License 4.0](https://creativecommons.org/licenses/by/4.0/).

INTRODUCTION

What if the tomato on your salad could boost your vitamin D levels? Or if strawberries lasted long enough to enjoy after Wimbledon? How about leafy greens without the bitter aftertaste? For decades, genetically modified (GM) food has had a serious image problem. Branded as "Frankenfoods" in the 1990s, GMOs were seen as unnatural and risky—designed to help farmers, not feed families better. But that story is changing fast. A new wave of **gene-edited foods** is shifting the focus from farm efficiency to **flavor, nutrition, and visual appeal**—things regular shoppers actually care about. And the science behind it is not just fascinating, it's also surprisingly gentle.

Beyond the GMO Stigma

Traditional genetic modification often involved adding genes from other species—like inserting fish genes into tomatoes to improve cold resistance. No wonder people were skeptical. But **gene editing**, especially a method called **CRISPR**, doesn't add anything foreign. It simply fine-tunes what's already there. Think of it like using the "cut" function in a word processor rather than copying and pasting in new paragraphs. Scientists can now switch off genes that cause bitterness, or bump up the ones that boost nutrition. The changes are precise, efficient—and yes, natural enough that many regulators don't even classify gene-edited foods as GMOs.

Enter the Purple Tomato and Friendly Greens

One of the buzziest examples is the **CRISPR-edited mustard green** developed by startup **Pairwise**. Known for its strong, wasabi-like burn, the leafy vegetable got a flavor makeover when scientists turned off the gene responsible for the "mustard bomb" effect. The result? A crisp, slightly spicy salad green that's rich in nutrients and far more likely to end up on your plate. The company is also developing **thornless, seedless blackberries** and **pitless cherries**—removing the obstacles (literally) between you and your fruit bowl.

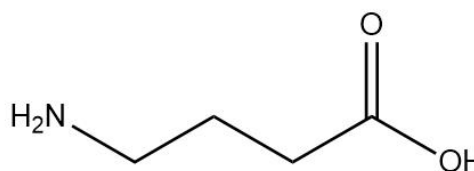


Over in the UK, plant scientist **Cathie Martin** has edited tomatoes to produce **vitamin D3**, helping address widespread deficiency in places where sunlight is scarce. A single tomato could deliver up to 30% of your daily vitamin D, potentially reducing the need for supplements and boosting health across the board.

It's Not Just Novelty—It's Nutrition

Other gene-edited crops already on the market include **non-browning apples**, **gluten-free**

wheat, and Japanese tomatoes rich in **GABA (gamma-aminobutyric acid)**, a neurotransmitter believed to lower blood pressure and promote relaxation. These aren't just gimmicks. They're smart responses to health, climate, and food waste concerns—packaged in delicious, everyday foods. Imagine a world where your produce is both medicine and comfort food. That's the vision.



gamma-aminobutyric acid

So... Is It Safe?

You're probably wondering, "Is this stuff actually okay to eat?" The answer, according to major scientific organizations, is yes. Reputable bodies like the **US National Academies of Sciences** and **The Royal Society** have repeatedly found no evidence that genetically engineered crops pose health risks. In fact, Americans have been eating genetically engineered foods since the late 1990s without any verified health issues. And gene editing is considered even safer because it doesn't add foreign material—it just speeds up what nature and traditional breeding could do, only more precisely.

Changing Laws, Changing Minds

Governments are beginning to catch on. The UK passed the **Precision Breeding Act** in 2023, clearing the way for gene-edited foods to reach shelves without the heavy regulatory baggage of GMOs. Countries like **Japan**, **the U.S.**, **Australia**, and **Canada** are doing the same. Even **New Zealand**, long a stronghold of anti-GMO sentiment, is rethinking its position. At the same time, public attitudes are starting to shift. A

UK survey found that once people understood the difference between gene editing and genetic modification, they were more open to the new technology—especially when the benefits are tasty, tangible, and health-related.

The Critics Remain

Of course, not everyone is convinced. Critics argue that even gene editing involves foreign DNA at some stages, and worry that **we still don't know the long-term effects**—on our bodies or the environment. Others fear that relaxing regulations could let **corporate interests** override public good, or distract from more pressing challenges like climate resilience and sustainable farming. "Pink pineapples and purple tomatoes won't fix the food system," says Pat Thomas from advocacy group Beyond GM. But even she acknowledges the appeal of these new, consumer-friendly crops.

Food You Actually Want to Eat

We're entering a new era of **genetically engineered food that people actually want to**

eat. It's colorful. It's crunchy. It's nutrient-packed. And it might just be the secret to making produce cool again. "We're not doing this to be trendy," says Bayer spokesperson Alexander Gutmann. "We're doing this to help feed a growing population, while respecting the planet and coping with climate change."

Whether or not you're ready for a bowl of gene-edited salad, one thing is clear: the science is no longer just about survival—it's about **pleasure,**

nutrition, and choice. And that's a recipe worth considering.

REFERENCES

Used PerkinElmer ChemDraw Professional v.16.0.1.4 software for chemical structure designing
<https://www.chemistryworld.com/features/making-genetically-engineered-food-palatable/4021232>