The Truth About GMOs

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Imagine biting into a perfectly red apple, unaware that fear, not science, shaped your opinion of it. For years, genetically modified organisms (GMOs) have been portrayed in a negative light, with many consumers worried about their safety and impact. But are these fears justified? Many people believe that genetically modified organisms (GMOs) are dangerous to human health, harmful to the environment, and only benefit large corporations. These myths are widely spread through specific people/organizations, social media, word of mouth, and even some food marketing labels. For example, the Center for Food Safety (2025) claims that "GE crops have not been proven safe" and "pose unique risks to human health." Similarly, the Non-GMO Project (2022) warns that "GMO products are not suitably tested and may cause unpredictable side effects." These messages, although not supported by common science, have shaped public perception and fed distrust toward biotechnology. Labels like "non-GMO" are used to appeal to consumer concerns, even when the scientific community strongly supports the safety of GMOs. These misunderstandings cause fear and opposition that are not based in fact, but rather in emotional reactions and misinformation. Although GMOs are often feared, scientific evidence shows that they are safe for human health, are environmentally beneficial in many cases, and can help address food insecurity. This essay will break down the myths versus facts on health risks, environmental impact, nutrition, and corporate control of GMOs.

Well, what even are GMOs? GMOs or genetically modified organisms are plants, animals, or microorganisms whose DNA has been changed using modern biotechnology, usually to improve their resistance to pests, increase yield, or enhance nutrition. They are a type of genetically engineered (GE) crop that plays a major part of the global food system today. According to the World Health Organization (2025), "GMOs are organisms in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating and/or natural

recombination." GMOs have been widely used in agriculture since the mid-1990s, especially in crops like soybeans, corn, and cotton. While some people fear GMOs because they involve gene editing, the reality is that humans have been modifying crops for thousands of years through selective breeding. Today's genetic engineering is just a faster, more precise version of that process. According to Dr. Pamela Ronald (2024), a plant geneticist at the University of California, Davis, "Genetic engineering is just one tool in the toolbox of plant breeding. It allows us to make specific changes that would be difficult or impossible through traditional methods." Understanding what GMOs are, how they work, and where to find reliable information about them is essential before forming an opinion. Since many people rely on social media or word of mouth rather than scientific sources, that's often how myths and misconceptions spread.

One very common myth that has been spread and one that I see on social media is, GMOs are unhealthy and can cause diseases like cancer. When the fact is, there is no credible scientific evidence that GMOs are harmful to human health. This myth continues to circulate, despite overwhelming evidence that contradicts it. According to the U.S. Food and Drug Administration (FDA, 2024), "GMO crops are not changed in ways that would increase the risk of cancer for the humans or animals that eat them." This evidence proves that fears about GMOs causing diseases are not supported by science. Decades of research involving hundreds of peer-reviewed studies, long-term animal feeding trials, and evaluations by independent scientific organizations have all concluded that genetically engineered foods are just as safe to eat as traditional foods. These findings are based on thorough testing for allergens, toxins, and nutritional content before GMO products are approved for the market. Furthermore, the FDA (2024) adds, "Research has shown that they are just as safe as non-GMO foods." This shows that fears about GMOs causing diseases are not supported by long-term scientific studies, which have consistently shown GMOs

to be as safe as traditional crops. A real-world example of these scientific studies comes from Bangladesh, the Philippines, and India, where GMO eggplant trials were conducted. According to Conrow (2021), these field trials “demonstrated that Bt eggplant is virtually immune to EFSB, safe for humans and the environment and welcomed by farmers.” These studies not only affirm the safety of GMOs for human consumption but also show real-life success in farming communities.

Additionally, while some believe GMOs cause health issues, another major myth is that GMOs damage the environment by promoting overuse of chemicals and reducing biodiversity. In, “Myths & Realities of GE Crops.” from *Center for Food Safety,* Center for Food Safety (2025) uses their article to negatively portray GMOs with no real evidence behind it claiming, genetically engineered crops can damage the environment by, harming beneficial insects, hurting soil health, and cross contaminating their genes to other plants. He says, “Laboratory and field evidence shows that GE crops can harm beneficial insects, damage soils and transfer GE genes in the environment, thereby contaminating neighboring crops and potentially creating uncontrollable weeds.” This fear is understandable given concerns about industrial agriculture, and while it’s true that some farming practices like monoculture (large-scale planting of a single crop) can damage ecosystems, blaming GMOs for all environmental harm is an oversimplification. In fact, in many cases, GMOs reduce the need for chemical pesticides and help promote sustainable farming practices. Research actually shows that GMOs can reduce the need for harmful agricultural practices. Missouri State University (2022) reported that “on average, genetic modification (GM) technology has reduced chemical pesticide use by 37% and soil erosion by 93%.” This means farmers can grow crops with fewer harmful chemicals. Fewer pesticides mean it protects beneficial insects like bees and butterflies which pollinate the plants.

Reduced soil erosion helps keep soil healthy and productive and prevents sediment from clogging rivers and streams. Additionally, GMO Answers (2021) says, “Herbicide-tolerant (HT) crops enable more farmers to adopt conservation tillage,” a farming method that protects soil health. Crops engineered for pest resistance reduce the need for insecticides. Drought-tolerant varieties help conserve water. GMO plants that reduce the need for tilling prevent erosion and protect habitats. These practices are visually compared in Figure 1, illustrating the benefits of conservation tillage over conventional methods.

Figure 1

Comparison of Conventional Tillage and Conservation Tillage Practices

Sl. No.	Particulars	Conventional tillage	Conservation tillage
1.	Tillage system	High intensity; plow based tillage system	Minimum tillage or zero tillage
2.	Fallowing system	Ideal fallow land without any crop cover on soil surface	Growing of cover crops
3.	Residue management	Complete removal or burning of crop residue	Maintaining at least 30% soil surface covered with residue
4	Nutrient management	Chemical based nutrient management (intensive use of chemical fertilizers)	Integrated nutrient management with inclusion of organic sources and microbial inoculations
5.	Cropping system	Mono-cropping of crops or single cropping system	Diversified crops and crop rotation
6.	Soil health	Poor/ degraded	Healthy soil
7.	Energy requirement	Higher	Lower
8.	Sustainability	Lower	Higher
9.	Footprint on natural resources	Higher	Lower

Note. This figure shows how conservation tillage differs from conventional methods in protecting soil structure and reducing erosion. Adapted from Shahane & Shivay (2021).

These findings suggest that GMOs, when used responsibly, can contribute to more sustainable farming completely disproving The Center for Food Safety’s claims and the myth

that GMOs damage the environment. Rather than destroying the environment, GMOs can be part of a larger strategy to make agriculture more sustainable.

Another common misconception is that GMOs are “unnatural” and therefore less nutritious than traditionally bred crops. The Non-GMO project (2022) when talking about the reason for the acres of GE crops grown in this country today says, “has nothing to do with nutrition, flavor or any other consumer benefit.” They believe that there is little benefit aside from the financial gains reaped by the firms producing GE crops, which couldn’t be further from the truth. Even if current GE crops aren't always engineered directly for better nutrition, biotech research is increasingly focused on nutritional improvements. According to Real Farm Lives (2022), the National Academies of Science, Engineering and Medicine “confirmed that GMOs are equivalent to non-GMO foods, in both composition and nutritional value.” In fact, some GMOs are specifically engineered to be more nutritious. Scientists use genetic engineering to increase levels of essential nutrients like vitamins, minerals, and healthy fats in crops. One example of this is golden rice, a variety developed to contain higher levels of beta-carotene, a source of vitamin A. Raman (2024) reports that golden rice was created to “prevent blindness in regions where local diets are chronically deficient in vitamin A.” This shows that GMOs can be engineered not just to resist pests, but to provide essential nutrients that save lives. These crops can help solve serious global nutrition problems. So, while not all GMOs are more nutritious, some are intentionally developed to address public health issues that conventional crops cannot solve alone.

Along with the other myths on GMOs, there is a widespread belief that GMOs are tools created by large corporations, such as Monsanto (now Bayer), to control the global food supply

and make money. While it's true that corporations play a large role in producing GMO seeds, this does not mean GMOs only benefit the rich. For example, the development of drought-tolerant maize in Africa is part of a public-private partnership called the Water Efficient Maize for Africa (WEMA) project. According to the African Agricultural Technology Foundation (2022), this project includes local scientists and is designed to benefit smallholder farmers in drought-prone areas. By increasing crop yields and resilience in challenging environments, GMOs can help ensure food security for vulnerable populations. This shows that GMOs aren't just tools for profit, they're also used by scientists and public agencies to help communities and small farmers that face food insecurity. While it's important to regulate big companies, dismissing all GMOs because of corporate involvement overlooks the benefits they can offer. Despite these positive facts, it's still important to acknowledge and address the concerns raised by those who remain skeptical of GMOs.

Even if GMOs are currently considered safe, some critics argue we should remain cautious. Their concerns are not entirely unsupported, as science has gotten things wrong before. For example, critics might point to the past approval of certain chemicals or drugs such as DDT or thalidomide, that were later found to be harmful, suggesting we should be skeptical of claims that GMOs are completely safe. This historical context is why many feel uneasy about embracing GMOs completely. One rumor, for example, claims that bananas are suffering because of genetic modification. But in reality, bananas are at risk precisely because they haven't been genetically modified and lack genetic diversity, making them highly vulnerable to disease. This highlights a key difference: unlike some harmful substances that were rushed to market, GMOs have been studied for decades by independent scientists around the world. According to the World Health Organization (2025), "GMOs have been assessed and tested more than any other food product."

Organizations such as the American Medical Association and the National Academy of Sciences also support the safety of GMOs. The overwhelming evidence shows that the benefits of GMOs far outweigh the risks. Instead of rejecting GMOs completely, we should advocate for strong regulation and ongoing testing to ensure safety while still using this valuable technology to feed a growing population and fight global hunger.

Although myths about GMOs continue to spread, scientific evidence shows that they are safe, environmentally friendly, and even essential in addressing food security. They are not the dangerous substances many believe them to be, nor are they tools of evil corporations alone. GMOs can reduce pesticide use, improve soil conservation, fight malnutrition, and help small farmers grow more food in difficult conditions. While researching this topic, I was surprised to learn how many global organizations support GMO use and how many myths are based on emotion rather than evidence. I now see how important it is to question information and look at what science actually says. This topic matters to me because it combines two things I care about, the truth and helping people. I've always believed that science should serve people and that everyone deserves access to safe, healthy food. If GMOs can be part of that solution, we shouldn't let misinformation stand in the way. Learning about GMOs has helped me think more critically, not just about food, but about how I evaluate sources and form opinions. In a world full of misleading headlines and social media buzz, taking the time to understand the facts really does matter. Next time you eat something labeled "GMO-free," remember, it's not what's missing that matters, but the science that's ignored.

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