Are GMOs Safe?

A Reading A–Z Level Z Leveled Book
Word Count: 1,730

Connections

Writing

Are GMOs safe? Take a stand. Write an article supporting or opposing the use of GMOs. Use information from the text to support your position.

Health

What food-labeling regulations has the U.S. Food and Drug Administration (FDA) established? Use the information in the book and your research to write food-label regulations based on what you think every consumer should know.

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Are GMOs Safe?

Multi Level
Z • Z¹ • Z²

Written by Julie Miller

www.readinga-z.com

Glossary

agriculture *(n.)* the science or practice of farming and raising livestock (p. 4)

altered *(v.)* made different; changed (p. 4)

assessed *(v.)* evaluated or measured something (p. 12)

beneficial *(adj.)* having a positive, useful, or favorable effect (p. 10)

biased *(adj.)* having or showing unfair support for one opinion, group, or set of beliefs over another (p. 12)

consumers *(n.)* people who buy or rent goods or services and use them (p. 7)

genetically *(adv.)* in a manner having to do with heredity and variation in living things (p. 4)

herbicides *(n.)* biological or chemical agents that kill unwanted plants (p. 7)

ingest *(v.)* to take in food or some other substance (p. 5)

pesticides *(n.)* chemical or biological substances that kill harmful animals or plants (p. 7)

processed *(adj.)* treated or modified to improve something or make it last longer (p. 6)

vulnerable *(adj.)* able to be hurt easily (p. 9)

Focus Question

Why is agriculture being altered with GMOs?

Words to Know

agriculture	genetically
altered	herbicides
assessed	ingest
beneficial	pesticides
biased	processed
consumers	vulnerable

Title page: A lab worker at the Monsanto company maintains GMO corn specimens.

Page 3: Demonstrators in Tucson, Arizona, protest GMO foods and the Monsanto company.

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Correlation

LEVEL Z	
Fountas & Pinnell	U–V
Reading Recovery	N/A
DRA	50

The Future of GMOs

People have been eating foods grown from genetically engineered seeds for only the past two decades. While hundreds of published reports have explored the benefits and risks of GMO foods, many people believe the jury is still out on whether or not GMO foods are safe.

Saving Seeds for a Rainy Day

A century ago, farmers could buy seeds for more than three hundred unique varieties of corn. Today, most commercially grown corn comes from hybrid seeds from the same few varieties of corn. Meanwhile, many of the world's historic and traditional foods have gone extinct—including 90 percent of historic fruit and vegetable varieties in the United States.

To address this problem, people have started seed banks around the world to save seeds from traditional, or "heirloom," crops. By preserving a diverse array of crops—as well as the knowledge of the people who grew them—they hope to ensure more food choices for future generations.

Some people are working to get new laws passed that would require labeling of GMO foods in the states where they live. In 2014, Vermont became the first state to require labels on GMO foods sold within its boundaries. Some businesses across the country, such as specialty grocery stores, have also pledged to label any GMO foods they sell.

At a two-day environmental conference in Paris in 2012, France's Prime Minister Jean-Marc Ayrault (standing) voted to maintain a temporary ban on the cultivation of GMO foods in his country.

The companies that develop, grow, and market genetically modified foods say that requiring GMO labels on their products will unfairly hurt their business. Spokespeople for the GMO industry argue that labels won't help educate the public with the facts about GMOs. Some say that due to public fears about the risks of GMOs, any label will scare people away. They say that labels will lump together GMO products that are made with different methods or ingredients. They warn that labels will only increase fear and slow development of new GMO products that might benefit people. Finally, they say that labeling every product will be expensive and complicated.

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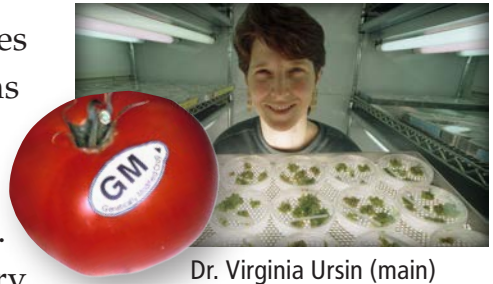
The Birth of GMOs

In 1994, the Food and Drug Administration (FDA) approved a new kind of tomato for sale in the United States. Called the Flavr Savr, it was grown from seeds that researchers **altered** in a laboratory. Unlike traditional tomatoes, this new variety stayed firm long after ripening. This feature allowed the tomatoes to ripen longer on the vine before they were picked and sent to market.



Dr. Virginia Ursin (main) worked on the first genetically modified tomatoes (inset).

Flavr Savr tomatoes were clearly labeled as being grown from seeds that were **genetically** modified. Initially, they sold very well. Within two years, however, concerns over safety had turned public opinion against them. They were removed from sale. The argument over genetically modified organisms (GMOs) had begun.

Since the birth of **agriculture** almost ten thousand years ago, humans have bred plants in order to grow food crops not found in the wild. For example, corn as it is known today never grew wild. Instead, farmers developed it from a wild grass called *teosinte* by replanting only the seeds from the plants they liked best.

To Label or Not to Label?

The debate about the benefits versus the risks of GMO foods has met with a different reaction in the United States than in many other countries around the world.

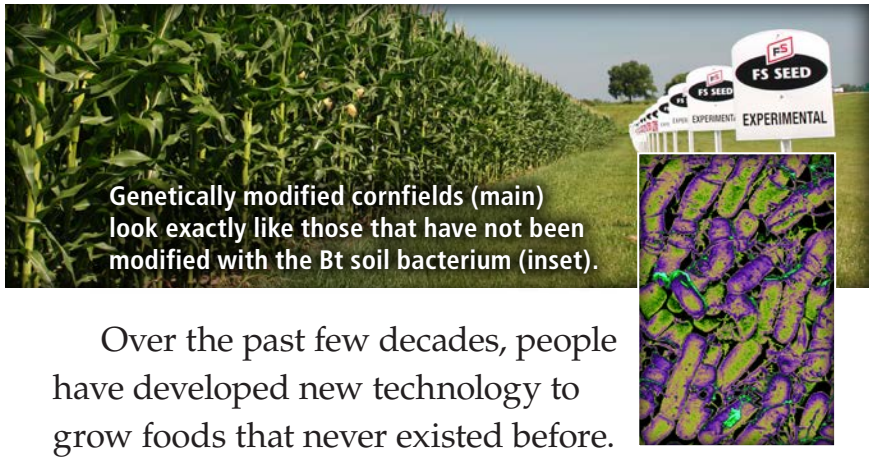
In more than sixty countries, GMOs have either been banned until further study can prove them safe, or foods containing GMOs must be labeled. In the United States, GMO foods are allowed on the market unless they can be proved to be harmful. The government does not require special labels for foods made from GMOs.

Yet public opinion polls show that most consumers in the United States want to see labels on foods containing genetically modified ingredients. They say that clearly labeling products containing GMO ingredients would help people choose whether they want to consume GMO foods.

In the United Kingdom, items that contain GMO foods must be labeled (right). In the United States, some non-GMO foods carry labels (left).

Many studies have **assessed** the health risks of eating GMO foods. However, people debate whether or not these studies have provided good enough answers. People on one side say that hundreds of published studies on GMOs show no significant harm to human health. People on the other side point to several hundred studies that they say do show that GMOs are harmful. For example, studies have charted increases in depression, weight gain, and Alzheimer's disease since GMO foods went on the market.

One reason people on both sides of the issue can't agree on the conclusion is that they can't agree on the evidence. Each side questions whether the other side's research is fair and accurate. GMO opponents say that the studies showing GMO crops are safe are not reliable because they are carried out by the same companies that profit from those crops. Advocates for the industry say that the studies cited by their opponents are faulty or **biased**. Furthermore, because private companies own the patents for most genetically engineered seeds, independent researchers have reportedly faced obstacles to doing strict, unbiased studies on those seeds. The positive or negative effects of any new technology cannot be fully understood without long-term study.



Genetically modified cornfields (main) look exactly like those that have not been modified with the Bt soil bacterium (inset).

Over the past few decades, people have developed new technology to grow foods that never existed before. Now, people don't have to grow generations of plants to make them look, taste, or behave differently. Scientists can give a seed a new trait in the laboratory simply by giving it a new gene. The gene can come from another type of plant or from a completely different organism.

For example, most of the corn grown in the United States today has been changed to include genes from a soil bacterium called *Bt*. The bacterium kills insects that **ingest** it. As a result, the new corn also has the ability to kill insects that feed on it.

Creating a brand-new organism by combining the genes of existing, unrelated organisms is known as *genetic engineering.* The new varieties are known as *genetically modified organisms (GMOs).* Some foods made from GMOs are now commonly eaten by people in the United States every day.

What—and Where—Are GMO Foods?

About 40 percent of all crops grown in the United States are genetically modified. The most common crops currently grown with GMO technology are alfalfa, cotton, canola, corn, sugar beets, soy, and zucchini. About 90 percent of the corn, cotton, and soybeans grown in the United States are GMOs.

In all, it's estimated that between 60 and 80 percent of **processed** foods in the United States contain GMOs. It can be surprising to learn about all the places these modified foods turn up.

For example, corn kernels are also made into products like corn meal and corn syrup. In turn, those products become ingredients in cereal, cookies, pet foods, and countless other foods. Most food labels include a list of ingredients. However, they usually don't say whether or not any of those ingredients were genetically modified. That means almost all Americans have eaten GMO foods without knowing it.

All the foods pictured above are made with corn.

Are GMO Foods Good for People's Health?

In some cases, people who support growing GMO foods say that those foods can solve serious human health problems. They say GMOs can produce more food for people in the world's poorest areas. In addition, some GMO crops have been developed to help fight disease in those areas. For example, scientists are experimenting with rice that has been changed to produce vitamin A. The new rice could help prevent blindness in places where people's diets lack vitamin A.

However, some people say humans shouldn't eat GMO food until scientists know more about its long-term effects on health. They are concerned that genetically modified crops or the chemicals to grow them may cause diseases such as cancer. Another concern is new food allergies because some GMO foods contain proteins that people have never eaten before.

Soy, eggs, milk, and peanuts are common food allergens.

GMOs in the Environment

Scientists develop the seeds for GMO crops in laboratories. But part of the GMO experiment is growing those crops on a wide scale in real life. Only then can experts discover how GMO seeds affect the environment and nearby wild plants and animals.

For example, wind can carry pollen from a field of GMO crops to a neighboring field of wildflowers. If that pollen fertilizes some of those wildflowers, their offspring might take on new traits bred into the food crop. Insects and other animals that carry pollen might also be affected. Some people fear that crops engineered to kill "pest" insects will also kill helpful insects such as ladybugs, bees, and butterflies. More studies need to be done to determine whether that claim is supported by fact.

The monarch butterfly is a **beneficial** insect that pollinates crops and other plants. Monarch populations have declined as much as 90 percent in the past twenty years. Scientists have disagreed about whether or not Bt toxins harm monarch larvae that hatch and feed on GMO plants.

The amount of milkweed (main), the main food source for monarch butterflies (inset), is being reduced due to herbicides being sprayed on neighboring GMO fields.

Some people are working to change that by asking the U.S. government to require that manufacturers label all food products containing GMO ingredients. The law already requires that most food products have labels listing ingredients and nutritional facts. People who want labels for GMO foods believe that **consumers** also have a right to know whether or not they're eating food grown using GMO technology.

The Benefits and Risks of GMOs

GMO food products became part of the U.S. diet in the mid-1990s. Spokespeople for the new technology listed many benefits of GMO foods for world agriculture. However, many people worry about possible risks to their families and the environment from genetically modified foods.

Many GMO crops on the market today have had new genes added to help them resist crop-eating pests. Some experts say that because of this, farmers can spray fewer **pesticides** on their fields. Many GMO crops are also designed to survive weed-killing chemicals. Farmers can spray **herbicides** on an entire field to destroy unwanted weeds without killing those crops.

Some people say GMO crops can be grown using fewer chemicals overall. As a result, they say GMOs make agriculture less harmful to the environment and food safer for people. They also say that the stronger GMO plants can increase crop yields, making farming more profitable.

However, some researchers say that as a whole, farmers have used more chemicals since they started planting GMO crops. Others say that some insects and weeds will adapt to the new crops and farmers' increased spraying of weeds. They fear that farmers will eventually need to use stronger chemicals to battle these new breeds of "superbugs" and "superweeds." This ongoing cycle could create new safety risks for both humans and the environment.

Farmers raising GMO crops can spray their entire fields with herbicides, which reduces the time and labor it takes to raise those crops.

Scientists record temperatures and light readings on laptops to learn how those variables affect plant growth.

People who support GMO foods say that their potential to solve world hunger outweighs any unknown risks. They say GMOs' larger crop yields will be needed to feed people as Earth's human population grows. Researcher David Weisser says that limiting GMOs "only hurts the world's starving population."

But some opponents say that widespread use of GMO crops is making the world's food supply more **vulnerable**. Experts at Princeton University warn that planting fewer varieties of crops "can lead to the quicker spread of diseases" in plants. For example, imagine if everyone grew the same GMO corn seeds and a disease came along that wiped out that corn. It would then also wipe out an entire key food source in one fell swoop.