

# Genetically Modified Organisms



## What is a GMO?

GMO stands for “Genetically Modified Organism”. This means that a change was made to the organism’s DNA, which is the code that dictates how an organism grows and behaves. Although people generally only think of crops when they hear “GMOs,” the term can actually apply to all living things, including bacteria, fungi, and animals.

<https://youtu.be/wYpJ66kyr7M>



## How is a GMO made?

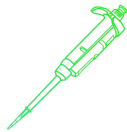
First, scientists must find the specific part of an organism’s DNA, known as a **gene**, that codes for the trait they want.

Next, the scientists copy the gene they identified.

Then, the identified gene is inserted into the DNA of a different organism, the organism they are trying to modify.

Finally, the modified organism is allowed to grow and express the inserted DNA of choice.

[https://youtu.be/5VXa\\_aCwbG0](https://youtu.be/5VXa_aCwbG0)



## Applications

GMOs are used for many different applications. Here are just a few examples:

### Medicine:

*Insulin*, which is a life-saving drug for diabetic patients, is produced in *E. coli* and *Saccharomyces cerevisiae* bacteria. *Mice* that have been genetically modified to be susceptible to SARS-CoV-2 are used to study potential COVID-19 vaccines.

*Gene therapy* is an experimental treatment for certain genetic diseases, in which a healthy gene is inserted into a patient to replace the defective gene causing their illness.

### Energy:

Scientists are working on genetically modifying different bacteria to break down plant material to create new usable biofuels.

### Sustainability:

Plants and bacteria are being engineered to detoxify pollutants from the environment, in a process called bioremediation.

GMO corn reduces the spraying of pesticides on agriculture fields since the corn is engineered to have innate pest resistance.



## Regulations

GMOs are rigorously tested and reviewed before being approved to go to market. Typically, a genetically modified plant will go through over 75 tests before being approved! Three agencies in the U.S. are responsible for reviewing GMOs and they each regulate different aspects of their safety. Genetically modified livestock are NOT sold as food in the United States.

### United States Department of Agriculture (USDA):

- Is the GMO safe to grow?
- Will test if the GMO has the new trait and whether its growth is comparable to non-GMO varieties

### Environmental Protection Agency (EPA):

- Is the GMO safe for the environment?
- Will test the GMO for its impact on soil, water, air, and nearby species in the ecosystem

### Food and Drug Administration (FDA):

- Is the GMO safe to eat?
- Will test the GMO for allergic reactions, toxicity, and nutritional content

Many food products at the grocery store contain “Non-GMO” labels, but do you know which foods are even allowed to be genetically modified? Products not containing the foods on this list, but have a “Non-GMO” label are misleading, as it is impossible for them to be genetically modified. Many companies use the label to boost their appeal among consumers.

<https://youtu.be/PR9zilOefUw>



## The 10 GMO Foods that are Sold in the United States

- Corn
- Soybeans
- Cotton
- Canola
- Alfalfa
- Potato
- Papaya
- Squash
- Sugar beets
- Apples