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## Genetically modified organisms - GMOs

Genetically modified organisms (GMOs) are plants, animals, or microbes that have had their DNA changed using genetic engineering techniques. Another term for this is bioengineered foods.

### Function

Genetic engineering can be done with plants, animals, or bacteria and other very small organisms. With genetic engineering, scientists take the gene for a desired trait in one plant or animal, and they insert that gene into the DNA of another plant or animal. Genes can also be moved from an animal to a plant or vice versa.

The process to create GMOs is different than selective breeding. This involves selecting plants or animals with desired traits and breeding them. Over time, this results in offspring with those desired traits. One of the problems with selective breeding is that it can also result in traits that are not desired.

Genetic engineering allows scientists to select one specific gene to implant. This avoids introducing other genes with undesirable traits. Genetic engineering also helps speed up the process of creating new foods with desired traits.

Genome editing is a newer method that involves adding, removing, or changing the DNA of a plant or animal in a targeted way.

The possible benefits of genetic engineering include:

- More nutritious food
- Tastier food
- Disease- and drought-resistant plants that require fewer environmental resources (such as water and fertilizer)
- Insect-resistant plants that allow less use of pesticides
- Increased supply of food with reduced cost and longer shelf life
- Faster growing plants and animals
- Food with more desirable traits, such as potatoes that produce less of a cancer-causing substance when fried

Some people have expressed concerns about GE foods, such as:

- Creation of foods that can cause an allergic or toxic reaction

- Unexpected or harmful genetic changes
- Inadvertent transfer of genes from one GM plant or animal to another plant or animal not intended for genetic modification
- Foods that are less nutritious
- Decrease in biodiversity

These concerns have thus far been unfounded. None of the GMOs used today have caused any of these problems. The US Food and Drug Administration (FDA) assesses all GMOs to make sure they are safe before allowing them to be sold. In addition to the FDA, the US Environmental Protection Agency (EPA) and the US Department of Agriculture (USDA) regulate bioengineered plants and animals. They assess the safety of GMOs to humans, animals, plants, and the environment.

## Food Sources

Cotton, corn, and soybeans are the main GMO crops grown in the United States. Most of these are used to make ingredients for other foods, such as:

- Corn syrup used as a sweetener in many foods and drinks
- Corn starch used in soups and sauces
- Soybean, corn, and canola oils used in snack foods, breads, salad dressings, and mayonnaise
- Sugar from sugar beets
- Livestock feed

Other GMO crops include one or more varieties of the following:

- Apples
- Alfalfa
- Canola
- Eggplant (not available in the United States)
- Papayas
- Pineapples
- Potatoes
- Salmon
- Squash
- Sugar beets
- Sugarcane
- Zucchini

## Side Effects

There are no side effects from consuming GMO foods.

## Recommendations

The World Health Organization, the National Academy of Science, and several other major science organizations across the globe have reviewed research on GMOs and have found no evidence that they are harmful. There are no reports of illness, injury, or environmental harm due to GMOs. Genetically engineered foods are just as safe as conventional foods.

The US Department of Agriculture has recently started requiring food manufacturers to disclose information about bioengineered foods and their ingredients.

## Alternative Names

Bioengineered foods; GMOs; Genetically engineered foods, genome editing; Living modified organisms; LMOs

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