



## What Are GMOs?

***GMO stands for genetically modified organism and is sometimes referred to as genetically engineered (GE), bioengineered (BE) or genetically modified (GM).***

A genetically modified organism, or GMO, is a plant, animal, or other organism that has had a gene from another organism transferred into it as an addition or a replacement. The goal of the new gene is to produce a helpful trait or characteristic in the modified organism, such as disease resistance, drought tolerance, or improved nutritional value. Conventional breeding lacks this kind of precise control.

### What foods are considered GMOs?

By 2019, federal regulators had approved 11 GMO crops for sale in the United States.



- ◆ **Corn (field and sweet)**
- ◆ **Soybeans**
- ◆ **Cotton**
- ◆ **Alfalfa**
- ◆ **Sugar beets**
- ◆ **Canola**
- ◆ **Papaya**
- ◆ **Summer squash**
- ◆ **Innate potatoes**
- ◆ **Pink pineapple**
- ◆ **Non-browning Arctic apples**



(Note: Most soybeans, field and sweet corn grown in the U.S. are genetically modified. Only a few varieties of the other crops on the list are genetically modified.)



*In 2018, the USDA passed the National Bioengineered Food Disclosure Standard to establish a standard for labeling GMO products. Beginning in 2020, these foods must be labeled with text, a symbol, an electronic link or a phone number for more information as mandated by the USDA.*



**To contact an expert in your area, visit [msue.anr.msu.edu/experts](http://msue.anr.msu.edu/experts) or call 888-MSUE4MI (888-678-3464)**

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*“MSU Extension supports consumer choice in the marketplace. We work with food production systems to meet consumer preference and demand. Additionally, MSU Extension provides Michigan residents with science-based research addressing the issues and challenges they may face, providing that information in a way that can be readily adapted into their lives and businesses.”*

*Ron Bates, Director - Agriculture, Agri-Business Institute 2019*



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Middle Left Photo: Apple Basket by Larisa-K, pixabay.com

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## Are GMOs Safe to Eat?

Scientific research conducted to date has shown that there are no hazards associated with eating GMOs.

### GMOs are Regulated

- The FDA regulates the safety of GMOs.
- All commercially available GMOs in the US have been through this consultation process and received FDA approval.



### GMOs are Safety Tested

- It is unlawful for anyone to market unsafe food.
- GMOs are tested to avoid the addition of known allergens

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# Why Use GMOs?

## Increase Productivity

- ◇ Ease of production
- ◇ Reducing the cost of production
- ◇ Improves crop quality



## Reduce Carbon Footprint

- ◇ Reduce fuel usage
- ◇ Reduce the use of toxic pesticides
- ◇ Improve ground water quality



## Increase Food Access

- ◇ Increase yield = Increase availability
- ◇ Make food more appealing
- ◇ Reduce food waste



## Nutrition and Medical Enhancement

- ◇ Develop Insulin
- ◇ Address nutrient deficiencies



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Middle Right Photo: Apple Basket by Larisa-K, pixabay.com

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## GMO Quick Facts

### Insulin Was the First GMO Product

In 1982, insulin produced by genetically modified bacteria became the first GMO product released to the public. This method of producing insulin for people with diabetes replaced the older method of extracting it from the pancreas glands of cattle and pigs. Animal-derived insulin, sometimes caused allergic reactions and didn't always work well. The synthetic insulin is produced in a variety of safer and more effective formulations.

*Did you know...*  
**Farmers & Environ-**

### Golden Rice

Scientists developed golden rice – a deep yellow variety that is genetically modified to produce beta carotene – to help fight the epidemic of vitamin A deficiency in developing nations. When people eat golden rice, their bodies convert the beta carotene in it into vitamin A. Golden rice has not been widely adopted due to societal barriers, skepticism about GMO foods, concerns about project costs, and the availability of other nutritional supplements. GMO foods like golden rice have the potential to help fight global malnutrition.



*Did you know...*

### The Difference between “Organic” & “GMO”

Under U.S. Department of Agriculture regulations, organic crops can only be grown using products and materials derived from natural sources (with a very few exceptions). For example, one common organic fertilizer is animal manure, and two common active ingredients in natural pesticides are microorganisms and plant extracts. The use of genetically modified products such as seeds and animal feed is prohibited in organic farming.

GMO and non-GMO seeds, animal feed, and other products, as well as synthetic and natural fertilizers and pesticides, are acceptable in conventional farming. As of 2019, USDA had approved GMO varieties of 11 crops for sale in the U.S.

### GMO Technology Saved Hawaiian Papayas

The Hawaiian papaya crop was in danger of being wiped out by a plant virus in 1992 until scientists created a disease-resistant papaya plant using GMO technology.



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