



Understanding Biotechnology: What is a GMO?

What is a GMO?

THE NON-GMO PROJECT: BUILDING SOURCES OF NON-GMO PRODUCTS

The Non-GMO Project Product Verification Program allows participants to submit products to be evaluated against the **Non-GMO Project Standard**. Products that demonstrate their non-GMO status in accordance with the Standard may become Verified and use the Non-GMO Project Verified mark.

GENETICALLY MODIFIED ORGANISMS

A genetically modified organism (GMO) is an organism in which the genetic material has been changed through biotechnology in a way that does not occur naturally by multiplication and/or natural recombination; cloned animals are included within this definition.

GMOs are changed through biotechnology, not through natural selection or traditional breeding methods.

Definition: Biotechnology

The application of:

- a. in vitro nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and the direct injection of nucleic acid into cells or organelles; or
- b. Fusion of cells beyond the taxonomic family, that overcame natural physiological, reproductive, or recombination barriers and that are not techniques used in traditional breeding and selection.

Biotechnology means artificially altering DNA in a context where only the genetic material of an organism is altered or artificially merging DNA from different species which would not reproduce on their own.

More specifically, and for the avoidance of doubt, biotechnology includes all of the following specific new breeding techniques:

New Breeding Techniques

Oligonucleotide-directed mutagenesis (ODM)
Zinc finger nuclease (ZFN); cisgenesis and intra-genesis
Agro-infiltration ("sensu stricto" and "floral dip")
RNA interference (RNAi)
RNA-dependent DNA methylation (RdDM) and reverse breeding (RB)

Transcription activator-like effector nucleases (TALEN)
Meganucleases and clustered regularly interspaced short palindromic repeats (CRISPR),
"Synthetic biology", and "gene drive" (each a "GE Technique")

What Foods are GMOs?

HIGH-RISK CROPS HAVE WIDELY AVAILABLE GMO VARIETIES

The Non-GMO Project High-Risk List identifies inputs that may be, contain, or be derived from organisms that are known to be genetically modified and commercially available. These inputs and their derivatives are subject to additional scrutiny under the Non-GMO Project Standard. The majority of these crops are engineered to produce an insecticide or tolerate the application of an herbicide.

High-Risk Inputs	
Alfalfa	Sugar beet
Canola	Yellow summer squash / zucchini
Corn	Potato
Cotton	Microorganisms and enzymes
Papaya	Animal products
Soy	

MONITORED-RISK CROPS

Monitored-risk inputs are those for which a GMO version exists, but is not widely commercially available. Such inputs may exist in the research and development stages, or may be inputs for which known GMO contamination has occurred. Other crops are included because they could be contaminated by cross-pollination from GMO crops.

Monitored-Risk Inputs	
<i>Beta vulgaris</i> (chard, table beets)	Wheat
<i>Brassica napa</i> (rutabaga, Siberian Kale)	Camelina (false flax)
<i>Brassica rapa</i> (bok choy, turnip)	Mushroom
<i>Cucurbita pepo</i> (acorn squash, pumpkin)	Orange
Flax	Sugarcane
Mustard	Tomato
Rice	Spider silk

Monitored-risk inputs are evaluated like low risk inputs; their monitored status does not impact testing or affidavit requirements. However, the Non-GMO Project keeps a watchful eye on these crops in order to prevent potentially ensuing GMO varieties from entering the supply chain unchecked.

Common Derivatives of GMOs

PROCESSED INGREDIENTS

Many common processed ingredients are derived from GMO crops, especially commodity crops such as corn and soy. The following non-exhaustive list includes some of the most common derivatives of high-risk crops.

Common Processed Ingredients

Ascorbic acid, sodium ascorbate, vitamin C	Textured vegetable protein
Citric acid, sodium citrate	Amino acids
Ethanol	Aspartame
Corn syrup	Flavorings, "natural" and "artificial"
Hydrolyzed vegetable protein	Lactic acid
Maltodextrins	Microbial Growth Media
Molasses	Vitamins
Monosodium glutamate	Xanthan gum
Sucrose	

ANIMAL-DERIVED INGREDIENTS

Livestock, aquaculture, and apiculture products are considered to be high-risk inputs because animal feed is very likely to contain GMOs such as corn, soy, and alfalfa. Animal-derived inputs must come from animals that ate a non-GMO diet to be used in Verified products. These inputs comply with the sampling and testing requirements of the Standard through the sampling and testing of Inputs to the animals' rations and/or the seed used to grow the inputs to the animals' Rations.

NEW GMOS

GMOs are being created with new genetic engineering techniques such as CRISPR. The Non-GMO Project is committed to preventing these new GMOs from entering the non-GMO supply chain. Learn more about these new GMOs in [Understanding Biotechnology: New GMOs](#).

