

Genetically Engineered Foods

In the Marketplace

A Series from Cornell Cooperative Extension's Genetically Engineered Organisms Public Issues Education (GEO-PIE) Project

SINCE 1995, U.S. FARMERS HAVE BEEN GROWING CROPS THAT ARE GENETICALLY ENGINEERED (GE). THESE PRODUCTS OF BIOTECHNOLOGY ARE COMMONLY REFERRED TO AS GENETICALLY MODIFIED ORGANISMS (GMOs).

Frequently Asked Questions

What is genetic engineering (GE)?

GE is the process of copying a gene from one living organism (bacteria, plant, or animal) and adding it to another living organism using biotechnological methods

Genes are the instructions all living things use to build and maintain their cells. Adding a new gene to a crop may give it a trait that is useful to growers and consumers, creating plants that are more resistant to insects and disease, that simplify weed control, or that produce fruits with longer shelf life.

In addition to their own DNA, genetically engineered plants also contain one or a few genes copied from common soil bacteria, plant viruses, or other plants. No GE foods on the market today have genes copied from animals.

Am I eating GE foods?

Recent estimates suggest that at least 60 to 70 percent of processed foods contain at least one ingredient from a GE plant—largely due to the widespread adoption of GE corn and soybeans by farmers. These two crops are common ingredients in a multitude of food products in the marketplace. Genetically engineered varieties of crop plants are not kept separate from non-GE varieties; they are mixed together at every step, from field to table, by farmers in their fields; by harvesting, shipping and storage equipment; and by mills and food.

Which food products might contain ingredients made from GE plants?

Soybean

In 2002 about 74 percent of the U.S. soybean crop was genetically engineered. Soy-based ingredients include soy protein, flour, isolate, lecithin, oil and isoflavones (see sidebar).

Corn

Farmers planted about 32 percent of the 2002 U.S. field corn crop with GE varieties. Corn-based ingredients include corn-flour, oil, syrup, starch, masa, and gluten (see sidebar). GE sweet corn, sold as corn on the cob and canned corn, is much less common (less than 3 percent). There is no GE popcorn.

Canola

Canola oil is extracted from the rapeseed plant, which is grown mainly in Canada, where more than 60 percent of the 2002 crop was grown from GE varieties. Canola oil is a common cooking oil and may also be found in many processed foods.

Cotton

Although you might not think of cotton as a food, it often is—cottonseed oil is used in fried snacks, peanut butter, candies, and many other products. More than 71 percent of the 2002 U.S. cotton crop was GE cotton.

Potato, Papaya, Yellow Squash, and Zucchini

Although some farmers grow GE varieties of these fruits and vegetables, they are rare in most markets in the northeastern U.S. Some processed foods may contain GE potatoes, but these GE varieties have been discontinued and have not been grown since the 2000 season.

Other Plants

GE varieties of tomato, rice, flax, sugar beet, and radicchio (red-heart chicory) have been approved by U.S. regulators but are not currently marketed and are not present in any foods.

Animals

There are no genetically engineered animals on the market.

Other Common Food Ingredients Derived from Corn and Soybean

Amino acids: cysteine, lysine, threonine, tryptophan, and others.

Sweeteners: aspartame, dextrose, fructose, sorbitol, invert sugars

Vitamins: A, B2, B12, C, and E

Miscellaneous: caramel syrup; cellulose; methylcellulose; malt and malt extract; mono- and diglycerides; monosodium glutamate; vegetable oil, fat, or protein; xanthan gum

Genetic Engineering in Food Production

Genetically engineered bacteria and fungi have been used in the food industry for almost two decades. Enzymes extracted from these organisms are routinely applied to the production of cheese, milk, beer, breads, candies, many vitamins and nutritional supplements, as well as soaps and detergents. Most cheese in the U.S. is made using the enzyme chymosin from a genetically engineered bacteria, rather than rennet, which in the past was extracted from calves' stomachs. GE brewers' and bakers' yeasts have also been developed, but are not currently being used by food processors. Additionally, many pharmaceutical drugs are made using GE bacteria and fungi, including insulin, human growth hormones, and vaccines.

Who regulates GE products in the U.S.?

Three U.S. agencies regulate genetic engineering:

- United States Department of Agriculture (USDA): environmental release and safety
- Food and Drug Administration (FDA): food safety for animals and humans
- Environmental Protection Agency (EPA): safety of pesticidal traits

Why aren't GE food products labeled?

The FDA considers the safety of a new GE food in comparison to a similar non-GE food. A GE food must be labeled or kept off the market entirely if it has any detectable difference in nutrition or allergenicity from a comparable non-GE food; no GE foods currently on the market fit these criteria.

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What's in genetically engineered food that wasn't there before?

All plants and animals have DNA, and use their DNA-based instructions called genes to make proteins. A genetically engineered plant carries one or more new genes, and usually (but not always) makes a new protein. These two additions—the new gene(s) and the new protein(s)—are the "new" parts that consumers are eating. But in many cases processing and cooking of foods, particularly highly-refined products like oils and sugars, removes or destroys DNA, proteins, or both. Studies also have not detected the new DNA or proteins in animal products such as meat, milk, and eggs, when the animals were fed GE plants.

This highlights one of the difficulties in detecting and tracking whether a food has been made from genetically engineered plants: in many processed foods and in most food ingredients there is no DNA or protein left to detect.

In the News

In the fall of 2000, many corn-based products were recalled from US stores because they were found to contain traces of Starlink corn, a variety of GE corn not yet approved for human consumption because of concern that it could cause allergic reactions. In most cases, Starlink corn contamination was detected in food products by the presence of the new DNA, but because these foods were highly processed, the new protein—the part that raised allergy concerns—could not actually be detected.

If you'd like to learn more about genetic engineering, visit the GEO-PIE Project web site at

www.geo-pie.cornell.edu

