Genetically Modified Foods

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Genetically modified foods are foods produced from living organisms that have undergone genetic changes using genetic engineering methods. Genetic engineering technologies work by introducing new traits in addition to greater control over traits when compared to traditional selection methods to improve traits and select desired mutations in organisms.

The discovery of DNA by Watson and Crk and the improvement of genetic technology in the twentieth century played a crucial role in the development of genetic transformation technologies. It was first approved in 1988 for the use of enzymes produced by genetically modified microbes in food manufacturing. Rennet (renase) produced by genetically modified organisms was used in a few countries in the 1990s. Commercial sale of genetically modified foods began in 1994, when Calgene Corporation marketed long-term storage-tolerant tomatoes. Most of the food adjustments have mainly focused on economically viable crops that are in high consumer demand such as soybeans, maize/corn, canola and cotton. Genetically modified crops have been transformed into crops that are resistant to weed pathogens and to improve their nutritional properties. Golden rice production in 2000 saw further improvement in the nutritional value of genetically modified foods. GM cows were developed carrying human genes, although it resolved the production approval bug in 2015 but was not on the market. , the GM salmon was the first GM animal approved for human consumption and the only animal approved for commercial production, sale and consumption by the Food and Drug Administration. Crop traits are often improved, for example improved nutrient level, pest resistance, weed resistance, product ownership of beneficial and therapeutic substances, and transfer to target organisms, providing these organisms

with high viability and productivity. This gives the food specific features that suit the taste and needs of consumers. The application of genetically modified foods also brings with it some potential risks, including the negative impact of genetically modified genes on humans and pollutions on the surrounding environment. These concerns lead to different attitudes towards genetically modified food products. There is scientific consensus that currently available food derived from genetically modified crops does not pose a risk to human health as it does in conventional foods, but each genetically modified food must be tested on a case-by-case basis before it is brought to the market and approved as a safe food item. healthy. However, the possibility that these foods will have negative effects in the long term is also contained, and this is subject to the influence of international manufacturers and the extent to which the market is affected by these negative effects. The legal and regulatory status of genetically modified foods varies by country, with some countries banning or restricting them, while others allow them to widely varying degrees, which vary according to the economic, political and scientific situation, the nutritional need of countries, geographical, social and religious status, and other factors

However, there are ongoing public concerns regarding food safety, regulation, labeling, environmental impact, research methods, and the fact that some genetically modified seeds, along with all new plant varieties, are subject to corporate plant breeder rights.

History Of Genetic Modification

Human-directed genetic manipulation of food began with the domestication of plants and animals through artificial selection around ten thousand BC, whereby organisms with desirable traits were bred and multiplied while excluding organisms with undesirable traits. With the beginning of the twentieth century,

interest in genetic content and DNA began to appear in the era of genetic engineering and genetically modified organisms. The enzymes produced by microbial genetically modified organisms were the first to apply genetically modified organisms in food production and were approved in 1988 by the US Food and Drug Administration. In the early 1990s, chymosin was approved for use. The cheese was usually made using a complex enzyme rennet that was extracted from the stomach lining of cows. The scientists modified the bacteria to produce chymosin, which was also able to coagulate milk, producing cheese curds. In 1994, the first approved genetically modified food was developed, where the tomato crop was released, bearing conditions and long storage periods, and China was the first country to introduce virus resistance genes in the tobacco plant in 1993, making it the first crop resistant to viruses, followed by the production of genetically modified potatoes, soybeans and corn and bush-resistant cotton and virus-resistant squash with golden rice production in 2000, increasing its nutritional value for the first time. By 2010, 29 countries had commercially grown GM crops and another 31 had given regulatory approval to import GM crops. The United States was the leading GM food producer in 2011, with 25 GM crops receiving regulatory approval. In 2015, 92% of corn, 94% of soybeans, and 94% of cotton produced in the United States were of genetically modified varieties in 2015. The first genetically modified animal approved for food uses Transformation of salmon with a growth hormone regulator gene From the Pacific Chinook salmon and an ocean-crossing catalyst, enabling it to grow year-round rather than just through the spring and summer in the US Since 2016 a genetically modified white mushroom has been approved and in 2021 some genetically engineered seafood has been approved in Japan.

Mechanisms and techniques of genetic modification

Genetically modified food production is a multi-step process. The first step is to identify a beneficial gene from another organism that you would like to add. The gene can be taken from a cell or synthesized synthetically, and then combined with other genetic elements, including the initiator and terminator region and a check mark. The genetic elements are then inserted into the desired genome. DNA is generally introduced into animal cells using ICSI, where it can be injected through the cell's nuclear envelope directly into the nucleus, or through the use of viral vectors. DNA is often introduced into plants using genetic material-mediated recombination by viruses, since only one cell is transformed using genetic material, the organism must be regenerated from that single cell. In plants, this is achieved through tissue culture. In animals, it is necessary to ensure the presence of nuclear material in the embryonic stem cells. Further tests are carried out using PCR technology, after which the transfer of the new gene to the host cell is detected.

Genetically modified plant and animal products

Almond fruits, citrus fruits, pears, pineapples, vegetables such as tomatoes, potatoes, zucchini, field crops such as rice, soybeans, corn, wheat, cotton, sturgeon mushrooms, sugar beets, oil plants, fodder plants, livestock such as cattle, sheep, goats, fish, birds, horses, camels, types of sea fruits, genetic engineering processes, viruses and some types of bacteria.

Benefits

Genetically modified foods have some desirable properties, including some benefits for surviving in harsh environments, improved nutrition, access to medicinal substances, and genetic resistance to pests and weeds. These properties can be beneficial to humans and the environment in certain ways.

Withstand Harsh Weather

Plants that have undergone genetic modification are able to survive harsh weather conditions. Genetically modified food crops can be grown on sites with sometimes unfavorable climatic conditions. The quality and yield of genetically modified foods is often improved. These foods tend to grow more quickly than those grown by traditional methods. Moreover, the use of genetically modified foods can be beneficial in resisting drought and poor soil.

Boost Nutrients

Increasing the levels of specific nutrients in food crops can be achieved by genetic engineering. The study of this technique, sometimes known as nutritional optimization, is already very advanced. Concentrated levels of nutrition and health-promoting chemicals, making it a desirable component of a varied diet. Among the notable achievements in genetic modification is golden rice, whose genome is altered by injection of a vitamin A gene from the daffodil plant that modulates vitamin A production. This leads to an increase in the activity of phytoin synthase, which thus produces a greater amount of beta-carotene, followed by a modification and improvement of the iron level and bioavailability. This affects the color of the rice and the content of vitamins, which is beneficial in places where vitamin deficiency is common. In addition, the increased content of minerals, vitamin A and protein played an important role in the prevention of childhood blindness and iron deficiency anemia.

The composition of fats can also be manipulated to produce desirable qualities and essential nutrients. Scientific evidence has shown that insufficient consumption of omega-3 polyunsaturated fatty acids is generally associated with the development of chronic diseases and developmental aberration. Dietary fats can be modified to gain an increase in saturated fatty acids with a decreased polyunsaturated fatty acid component. The genes encoding the synthesis of polyunsaturated fatty acids are therefore inserted into plant cells, which increases the synthesis of omega

polyunsaturated acids. This omega-3 polyunsaturated fatty acid is responsible for lowering the level of bad cholesterol and triglyceride level as well as the rate of cardiovascular disease.

Production of therapeutic materials

GMOs, including potatoes, tomatoes and spinach, are applied in the production of substances that stimulate the immune system to respond to specific pathogens. With the help of recombinant DNA techniques, genes encoding viral or bacterial antigens can be genetically transcribed and translated into plant cells. Antibodies are often produced in response to the introduction of antigens, as pathogenic bacteria elicit the immune response to specific antigens. Genetically modified organisms are typically used for use as oral vaccines, allowing the active substances to enter the human GI tract, targeting the GI tract that stimulates the mucosal immune response. This technology has been widely used in the production of vaccines including rice, corn, and soybeans. In addition, genetically modified plants are widely used as bioreactors in the production of pharmaceutical proteins and peptides, including vaccines, hormones, human serum albumin, etc. The suitability of genetically modified plants could help meet the demand for the rapid growth of therapeutic antibodies. All this gave a new impetus to the development of medicine.

Health and safety

Opponents claim that the long-term health risks have not been adequately evaluated and suggest various combinations of additional testing, labeling or removal from the market.

There are no certifications for foods that have been verified to be genetically modified - in particular in a way that is guaranteed to be well-understood, safe and environmentally friendly - as well as organic (i.e. produced without the use of

chemical pesticides) in the US and possibly the world, giving consumers a two-way choice of either food Genetically modified or organic food.

Tests

The legal and regulatory status of GM foods varies by country, with some countries banning or restricting them, while others allow their use to varying degrees of regulation. Countries such as the US, Canada, Lebanon and Egypt use high parity to determine if more testing is needed, while many countries such as those in the European Union, Brazil and China only allow the cultivation of GMOs on a case-by-case basis. In the United States, the Food and Drug Administration has determined that GMOs are "generally recognized as safe and therefore do not require additional testing if the GMO product is substantially equivalent to the non-GMO product. If new substances are found, further testing may be needed. of tests to satisfy concerns about potential toxicity, sensitivity, or potential for gene transfer to humans or genetic hybridization of other organisms.

Some studies claiming to show harm have been discredited, leading in some cases to academic condemnation against the researchers