



Genetically Modified Organisms by using Recombinant DNA Technology

Francisco Rocha*

Department of Medicine, University of California, USA

DESCRIPTION

Any organism whose genetic material has been altered using genetic engineering techniques is considered a Genetically Modified Organism (GMO). The precise definition of a genetically modified organism and what constitutes genetic engineering varies, but the most common is an organism altered in a way that “does not occur naturally through mating and/or natural recombination.” From animals to plants and microorganisms, a wide range of organisms have been Genetically Modified (GM). Genes have been transferred within the same species, across species, and even across kingdoms. Endogenous genes can be enhanced, altered, or knocked out, or new genes can be introduced. It takes several steps to create a genetically modified organism. To insert a gene into a host organism, genetic engineers must isolate it and combine it with other genetic elements such as a promoter and terminator region, as well as a selectable marker. There are several methods for inserting the isolated gene into the host genome. Recent advances in genome editing techniques, particularly CRISPR, have simplified the production of GMOs. In 1973, Herbert Boyer and Stanley Cohen created the first genetically modified organism, a bacterium that was resistant to the antibiotic kanamycin. Rudolf Jaenisch created the first genetically modified animal, a mouse, in 1974, and the first plant in 1983. The Flavr Savr tomato, the first commercially available genetically modified food, was introduced in 1994. The GloFish was the first genetically modified animal to be commercialised in 2003, and the Aqu Advantage salmon was the first to be approved for food use in 2015. Bacteria are the most easily engineered organisms and have been used in research, food production, industrial protein purification (including drugs), agriculture, and art. They have the potential to be used for environmental or medical purposes. Fungi have been designed with similar

goals in mind. Viruses are useful vectors for inserting genetic information into other organisms. This application is especially pertinent to human gene therapy. There are plans to remove the virulent genes from viruses in order to develop vaccines. Plants have been engineered for scientific research, to produce new plant colours, to deliver vaccines, and to produce improved crops. Despite having the most human health and environmental benefits, genetically modified crops are the most publicly debated GMOs. The vast majority are designed to be herbicide resistant or insect resistant. Golden rice has been genetically modified with three genes that boost its nutritional value. Other applications for GM crops include bioreactors for producing biopharmaceuticals, biofuels, or medicines. Animals are much more difficult to transform, and the vast majority are still in the research stage. Mammals are the best model organisms for humans, so those genetically engineered to resemble serious human diseases are critical for treatment discovery and development. Human proteins expressed in mammals are more likely than those expressed in plants or microorganisms to be similar to their natural counterparts. Livestock is genetically modified to improve economically important traits such as growth rate, meat quality, milk composition, disease resistance, and survival. Fish that have been genetically modified are used for scientific research, as pets, and as food. The use of genetic engineering to control mosquitoes, a vector for many deadly diseases, has been proposed. Human gene therapy is still in its early stages, but it has been used to treat genetic disorders such as severe combined immunodeficiency and Leber's congenital amaurosis.

CONCLUSION

Many people have expressed concerns about the development of GMOs, particularly their commercialization. Many of these concern GM crops, whether the food produced from them is

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Corresponding author Francisco Rocha, Department of Medicine, University of California, USA, E-mail: ar23@uf.us

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safe, and the environmental impact of growing them. Other concerns include regulatory authorities' objectivity and rigour, contamination of non-genetically modified foods, food supply control, life patenting, and the use of intellectual property rights.

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CONFLICT OF INTEREST

The author's declared that they have no conflict of interest.