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The question of Genetically Modified Foods (GMF)



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Issue:	The question of Genetically Modified Foods (GMF)
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Introduction

Genetically modified foods (GMFs) can be defined as foodstuffs in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating and/or natural recombination. (1) Genetically modified food is produced because there is generally some perceived advantage (1) it has either in terms of the actual food produced (taste, size, texture, etc.), or because it is easier to grow, i.e., more resistant to drought, bacteria, or other issues that could affect its development.

GM is a technology that involves inserting DNA into the genome of an organism. To produce a GM plant, new DNA is transferred into plant cells. Usually, the cells are then grown in tissue culture where they develop into plants. The seeds produced by these plants will inherit the new DNA. (8) There is ongoing research into the long-term health risks—or lack thereof—of GMF consumption.

These foods are usually engineered to have either better taste, texture, or, sometimes, simply to grow more easily and effectively. This may mean that they are resistant to pests, drought, or other factors which inhibit their growth. However, companies that produce GMFs also often produce the products needed to successfully cultivate them, which can lead to economic dependence and as a result some countries have entirely or partially banned GMF foods.

Definition of Key Terms

Genetically Modified Food

Genetically modified foods (GMFs) can be defined as foodstuffs in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating and/or natural recombination. (1)

Biotechnology

This term refers to the use of living organisms to solve problems or develop new products. Genetic modification is one example of biotechnology; vaccinations and antibiotics were also created via biotechnology. (4)

Organic

(Of food or farming methods) produced or involving production without the use of chemical fertilizers, pesticides, or other artificial chemicals. (5)

Genetic Modification

Genetic modification is the process of modifying an organism by adding new genetic material or DNA. It's also called genetic engineering or genetic manipulation. The goal of genetic modification is introducing new traits that are not currently present in that organism, including insect resistance, hardiness or modified nutrient content. (4)

Genome

A genome is an organism's complete set of DNA, including all of its genes. Each genome contains all of the information needed to build and maintain that organism. (6)

Economic dependence

Economic dependence is an unending situation in which countries, economies and economic agents depend on each other and a variety of different economic and non-economic factors for economic and non-economic reasons. (7)

General Overview

Despite the plethora of apparent advantages of GMFs, the novelty of this technology and the lack of long-term research means that the health risks of consuming GMFs over a prolonged period of time are as of yet unknown. While there are many scientists who declare that the claims made about GMFs not being safe are unfounded (2), there are also those who claim that, because of the lack of testing and the way in which the genomes of organisms are modified in radical ways, GMFs' benefits may not outweigh their health risks.

Main Advantages of GMFs

One advantage of GMFs is that they have managed to significantly reduce farmers' pesticide use the world over (2). Pesticides, especially due to ammonia runoff, often contaminate water supplies in ways that make the source of contamination very difficult to identify and thus remove. Therefore, those who are extremely against pesticides may find a solution in GMFs that use pest-tolerant genes to reduce the likelihood of crop failure caused by pests such as African stalk-borers, which can wipe out up to 40% of harvests per annum. This makes a significant contribution to avoiding world hunger; if more corn can be produced, it stands to reason that more people can be fed. Moreover, it is undeniably the case that food prices have plunged since the introduction of GMFs (2), which increases the revenues of farmers and therefore boosts the economy of a country.

GMFs and crop yield

Several studies have shown that GMFs can significantly increase crop yield. This is largely due to the way in which the genetics of the organism in question are modified, especially with regard to resistance to factors that can destroy significant proportions of crop yield. For example, a 2017 report published by the Cornell Science alliance shows that 'between 1996 and 2015, GM crops increased global production by 357.7 million tons of corn, 180.3 million tons of soybean, 10.6 million tons of canola and about a ton of sugar beet. In addition, the report mentions that GM crops significantly reduced the use of agricultural land due to this higher productivity.' (9) Greater agricultural yield also means that fewer acres of land need to

be consecrated to farming; thus, less rainforest needs to be razed in order for the required agricultural output to be met.

Some key examples of crops that have been genetically modified and result in directly greater yields are as follows: 'a wheat with 20 percent higher yield, developed by Rothamsted Research in the United Kingdom, and another GM wheat with larger grains developed by the Austral University in Chile; a soybean with 36 percent more grain developed by Washington State University; a mustard with 25 to 34 percent more seeds developed by the University of Delhi in India; a corn with 50 percent larger kernels and an increased number of grains developed by the Cold Spring Harbor Laboratory (CSHL) in the United States; and a rice with a 54 percent higher yield developed by public sector researchers from the United Kingdom and China.' (9)

Economic issues with GMFs

On the other hand, the main problem with GMFs lies in the dependence that is created on the companies that produce GMFs, notably Monsanto. Farmers growing GM crops in the US and elsewhere do so under contract to the biotechnology company which sells the seeds and the related herbicides. (3) GM seeds are more expensive, and the technology fee can often add up to 40 per cent on to the farmers' costs (3). Furthermore, the company which produces the seeds may produce the only fertilisers and soil which the crops need once they have grown. As such, dependence on one multinational company is created rather than the money's going toward the country's own supplies and building those.

Long term effects and research into GMF consumption

Despite the advantages of GMF, little is known about long-term and repeated consumption of such engineered foodstuffs. There are several problems that could potentially arise as a result of long-term exposure or consumption. Firstly, drug resistant cell populations could compromise therapy, depending upon selection pressure (10) These resistance levels, if they continue, must be evaluated to ensure that they do not pose a problem to the health of the individual.

One key thing that must be avoided when considering whether or not to use GMFs is the use of genetic sequences that could produce a selective advantage of integrate into other genomes. Genetic engineering could also produce metabolic imbalances which in turn can lead to an array of health complications (10), and as such any GMF must be evaluated with regard to the food matrix within which they are consumed (10), which makes testing hard given the enormous variety.

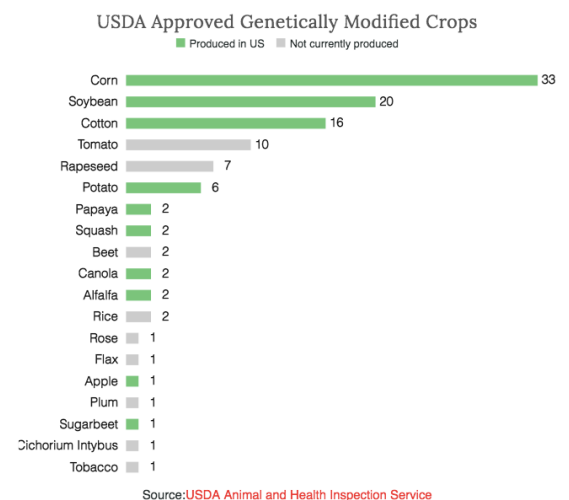
Major Parties Involved

Monsanto

Monsanto Company is an agrochemical and agricultural biotechnology corporation wholly owned by Bayer. It is headquartered in Creve Coeur, Greater St. Louis, Missouri. Monsanto developed Roundup, a glyphosate-based herbicide in the 1970s and is now a major producer of genetically engineered crops.

European Union

The European Union has legislation in place to restrict the use and sale of GMFs. The self-declared objective of such legislation is as follows: “The EU’s legislation and policy on GMOs, based on the precautionary principle enshrined in EU and international legislation, is designed to prevent any adverse effects on the environment and the health and safety of humans and animals, and it reflects concerns expressed by skeptical consumers, farmers, and environmentalists” (11). This is because numerous countries within the EU also have taken issue with the negative aspects of GMFs, such as France, which has placed a ban on corn as a GMF. In September 2017, Monsanto lobbyists were banned from entering the European parliament after the multinational refused to attend a parliamentary hearing into allegations of regulatory interference. (13)



United States of America

The United States of America has one of the most relaxed policies concerning genetically modified foods. In general, there is no requirement that GMF foods be labelled as such or that they are sold in restricted quantities. Over 90% of soybeans in the United States have been genetically modified; other food crops include sugar beets, alfalfa, canola, papaya and summer squash. The FDA (Food and Drug Administration) has recently approved apples that do not brown and potatoes that do not bruise. (12)

Peru

Peru has implemented a ten-year ban on Monsanto and all genetically-modified foodstuffs. (14) This arose largely as a result of consistently-applied pressure from local farmers, and the country is joining a small but growing list of countries that are placing legislative restrictions on the consumption of GMFs.

Timeline of Key Events

- 1983** Scientists create genetically modified tobacco resistant to an antibiotic(15)
- 1985** First GM crop trials begin around the world, including the UK (15)
- 1992** Phrase "Frankenfood" coined by Paul Lewis, a US college professor (15)
- 1993** US Food and Drug Administration allows companies to market GM seed (15)
- 1994** The first GM food, the Flavr Savr tomato, is approved in the US (15)
- 1996** GM tomato paste arrives in Britain, prompting backlash from Greenpeace and Friends of the Earth (15)
- 1996** Herbicide-tolerant GM soya bean available in US (15)
- 1998** Arpad Pusztai claims on TV that GM potatoes harm rats (15)
- 1999** Downing Street confirms that Tony Blair has eaten GM food and regards it as safe (15)

2003 Farm scale trials show herbicides used with some GM crops can reduce weeds and seeds eaten by wildlife (15)

2004 GM maize is approved for planting in Britain (15)

2006 German biotech firm BASF gets permission for five-year trial of blight-resistant GM potatoes in Britain (15)

2007 Government backs industry call to bring GM to Britain (15)

2012 Peru implements a ten-year ban on Monsanto products and other GMFs

Previous Attempts to Resolve the Issue

The main significant event that the UN has been involved in is the Cartagena Protocol on Biosafety of 2004. “The Cartagena Protocol, which entered into force last September, is designed to ensure the safe transfer, handling and use of GMOs that may adversely effect the conservation and sustainable use of biological diversity, taking also into account risks to human health. It forms part of the Convention on Biological Diversity negotiated under the auspices of the UNEP and signed by over 150 Governments at the 1992 Rio Earth Summit.”(16)

However, as this is a relatively new issue in the grand scheme of things, there have been a relatively low number of UN resolutions, treaties, or events on this subject matter.

Possible Solutions

There are many possible solutions to the controversy surrounding GMF production and sale. The main solution is to find a balance between the good and the bad; that is, to find a way in which the benefits can be reaped without farmers losing out economically or falling into a cycle of economic dependence. Full trials will also need to be carried out to ensure that the safety of GMFs is adequate for widespread sale and distribution without any repercussions either on the consumers or on the producers.

World-wide legislation that regulates consumption of something to integral to human life as food is also a viable and possibly necessary option. As such, a resolution passed by a United Nations General Assembly would be a highly recommended course of action as it would ensure unity on a controversial issue. As globalisation increases and farming techniques become ever-more efficient, it becomes even more pressing to find solutions that resolve this controversy.

Lastly, the monopoly that multinational companies hold over the agribusiness of many states as a result of genetically modified foods should be regulated. This has resulted in the economic dominance of big business over state economy, which, especially for Less Economically Developed Countries (LEDCs) can be a significant hindrance. As such, these companies should perhaps be subsidised by countries' governments or give the tools for GMF manufacture to governments who need it, especially those who suffer from food insecurity.

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