



## **Globalization of Genetically Modified Foods and their Effect on Human Health**

**Khalid Hamdan Alotaibi**

Department of Public Health, College of Medicine, Shaqra University, Dawadmi, KSA

\*Corresponding author: [kalruwis@su.edu.sa](mailto:kalruwis@su.edu.sa)

### **Abstract**

**Introduction-** Genetically Modified Organisms (GMOs) is being adopted by the developing world despite that most of the European nations have banned them. The genetic engineering of crops has triggered heated ethical debates related to their potential harm to human health and the environment. **Methodology** – Qualitative approach. **Conclusion-** The uncertainty about the potential implications of GM foods on human health and the environment have been central concerns raised by majority of those opposed to the GMOs. Several benefits have also been highlighted by those in support of the integration of biotechnology into farming. These include the increased productivity as well as the possibility of alleviate poverty and bring about food security in the developing world.

**Keywords:** GMOs, food security, Toxicity, Food Allergies, Antibiotic resistance. human health,

### **Introduction**

Genetically modified foods emerged towards the end of the 20<sup>th</sup> Century. Follow the rapid shrinking of the world due to aspects of globalization; ideas are increasingly spreading from one point to the next with much ease than it was the case before (Falkner and Gupta, 2009, 114). Biotechnology, specifically of Genetically Modified Organisms (GMOs) is being adopted by the developing world despite that most of the European nations have banned them. The genetic engineering of crops has triggered heated ethical debates related to their potential harm to human health and the environment. Issues like allergies, and exposure to genes or chemicals which may be harmful can sometimes continue to present them as GMOs continually grow (Nodoushani, Sintay and Stewart 137).

### **Problem Statement**

Globalization has been a primary influence of cultural, political and economic homogeneity. The debate on the impact of its influence continues to stir different problems across the world. One such problem is the spread of Genetically Modified (GM) foods and their spread from the United States to the rest of the world. Some of the potential disadvantages of the spread of GM include the probable harm they present to human health and the environment. The need to reduce the risks of such effects is an important objective. In this paper, the role of technology and scientific research in reducing the effects of GM foods is researched upon and discussed.

## Aims and Objectives

The aims and objectives of this report include the following:

- i. Analyzing how globalization has influenced the use of GMOs in the developed and the developing world
- ii. Identifying the potential harm posed by genetically modified foods.
- iii. Evaluating the global anti- GMO response by different global entities
- iv. Assessing the success/ failure of the global response to the risk posed by genetically modified foods.

## Methodology

The present study is a case control study conducted in Dawadmi, College of Medicine, Dawadmi KSA.

### Rationale for the study

The study took a qualitative approach. The researchers took to critical analysis of published works on globalization and the impact it's as had on genetically modified organisms. The effect of globalization, whether positive or negative, on the biotechnology, is central to this study. Since the use of GMOs spread from a central point to other parts of the world, this report seeks to explain the factors that contribute to this spread. The study also determines the role of globalization in the anti-GMO policy formulation and the formation of global bodies that are opposed to the genetically modified foods (Shetterly,60).

## Discussion

### Impact of GM food/crops on human health and the environment

Despite the many benefits that people attribute to the use of genetically modified foods, negative reaction to these foods in the global scale ranges from mild unease to activist opposition (Rzymiski, 690). The typical concerns raised against genetically modified foods include the following:

- i. Whether or not it is ethical for scientist to genetically modify living organisms and Plants.
- ii. Whether the genetic modification of foods is inherently hazardous.
- iii. Whether it is possible to unwittingly tamper

- with the safety of food crops through Genetic modification.
- iv. Whether GM crops and foods pose any threat to the environment and ecosystem, by
- v. Interfering with biodiversity and eliminating beneficial organisms.
- vi. Whether the introduction of genetically modified crops is in full knowledge and understanding of the consequences.

Of the above concerns that shape the debate about the use of genetically modified foods, the issue of public safety and the concern about the environment are the common denominators. By interfering with biodiversity, GM foods will eventually have devastating implications on the environment.

### Biodiversity

It is not very clear as to how the use of genetically modified crops will impact on biodiversity. However, this is looming controversy surrounding the stability of GM crops. There are various concerns that ensue from this scientific uncertainty. First, it is anticipated that GM technology could lead to the contamination of crops in the process of gene transfer. This can result in genetic pollution and the emergence of super weeds that can eventually impact adversely on biodiversity (Danone 1). There is substantial evidence that through aspects such as cross-pollination also, genes could be transferred and mixed with non-GM crops or even their weed relatives. As argued by Holmberg, an herbicide-tolerant gene in the plant could be transferred to a weed relative of the plant mutating to a completely resistant super weed. The chart below illustrates the increase in the rate of super weeds.

## The Rise of Superweeds

Weed species often become resistant to herbicides. Glyphosate resistance, once deemed unlikely, rose after engineered crops were introduced in the mid-1990s.

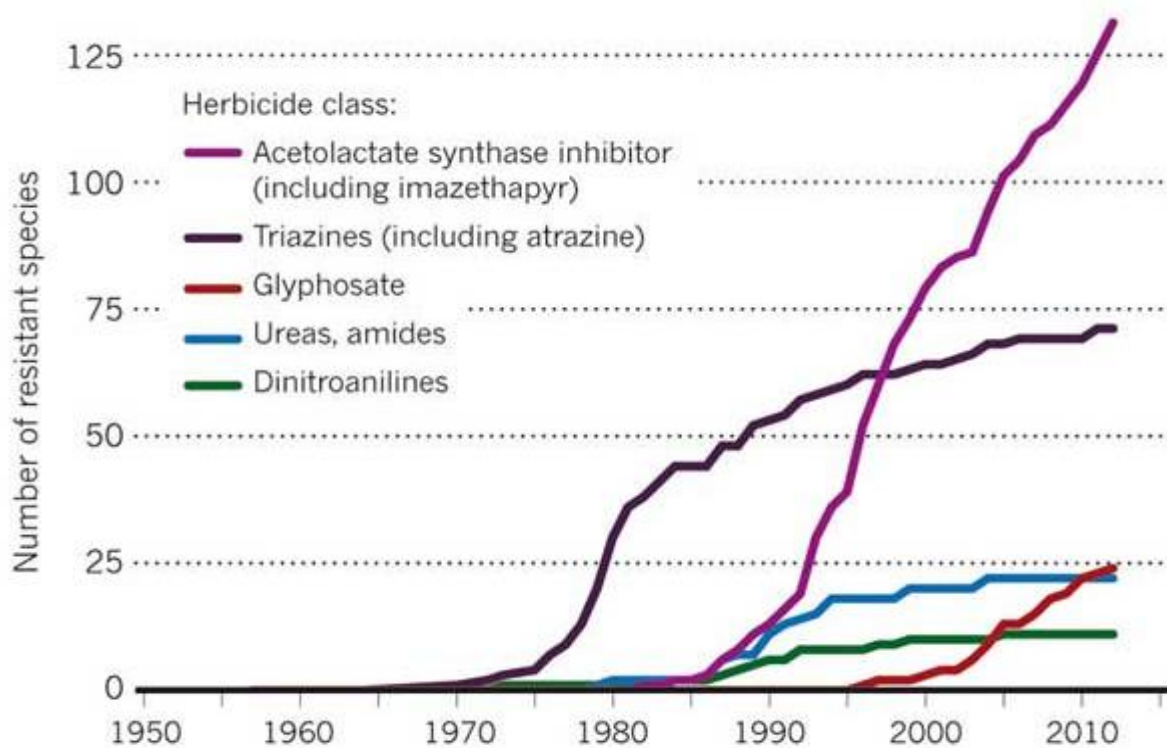


Figure 2 The Rise of Superweeds (Source: Gilbert, 2015)

Second, GM crops modified to achieve resistance to pests and diseases can affect non-target species that are otherwise beneficial. For instance, as claimed by Hall and Moran (31), BT maize pollen is toxic for the monarch butterfly. The monarch butterfly species lives only in Mexico, Canada, and the U.S., where precautionary measures are highly employed. However,

its close relatives in other parts of the world can be eliminated and, for this reason, result in interference to the biodiversity.

### Human health concerns

Strong and often polarized opinions exist around the issues of human health and food safety following the uncertainty surrounding the potential risks of genetically modified foods.

According to Hall and Moran (33), GM foods are very unsafe, and the existing safety assessment and

measures employed by those in support of them cannot guarantee public safety. There is various documented health risks associated with GM foods. Among these risks are the intensifying cases of allergies, antibiotic resistance, and even toxicity (Robinson and Leonhardt, 14).

### Food Allergies

Food allergies pose a public health threat as an approximated 5% of children, and 2% of the adults in the U.S. are affected by food allergies (FSA). The numbers increase with the spread of the products to other parts of the world as a result of globalization. These reactions occur when an otherwise harmless protein enters the human system and triggers an immune response (Nodoushani, Sintay and Stewart 137). GM foods such as soybeans are the common sources of these allergic reactions that pose dangers to human health.

## **Toxicity**

Under normal circumstances, most plants release substances that are poisonous to humans. However, these toxins are at extremely low levels that cannot harm humans in any way. Inserting exotic genes into plant systems is the cause of the concern since they can result in the production of toxic at levels that can be harmful to human health. For instance, according to Hall and Moran (35), GM potatoes bred to increase resistance to certain diseases have showed the tendency to produce high levels of a toxic substance called glycol-alkaloid.

## **Antibiotic resistance**

The increased number of highly resistant bacteria strains can be partly attributed to the consumption of genetically modified foods. Through the natural process of mutation, bacteria develop resistance. The antibiotic resistance genes are used by biotechnologists as selectable markers while inserting exotic genes into plants. There is a growing concern that bacteria residing in the guts of humans can absorb this resistance and mutate into uncontrollable new states (Robinson and Leonhardt, 14).

## **Global Anti - GMO Response through Organizational Actions and Strategies**

Several environmental and consumer organizations have come up with precautionary policies and measures against genetically modified foods. Rather than taking unknown risks, the anti-GM foods campaigners insist on the importance of human safety. The use of GM oilseeds and cereals as part of animal feed has also faced substantial resistance from anti-GMO activists in different parts of the world. For instance, European nations such as the UK, France, and Germany banned the use of ingredients derived from GM crops in animal feed (Boccia and Vijay, 78). A significant part of the current globalization and GM food debate has been focused on concerns of whether or not the economic integration emanating from globalization has resulted in the formulation of cross-national anti-GMO regulations. Several researchers in the field have sought to examine the domestic and international response to the spread of genetically modified foods and the trends towards the development of international regulatory policies. Much of the literature on the GMO policy domain convergence has also examined the efficiency of these policies (Nodoushani, Sintay and Stewart 61). Some scholars pointed to corporate interest as the force

behind the convergence of global pressures to develop restrictive GMO policies and global regulatory approached (Edwards, 505).

The policy ground for GM crops is made of a complex system of both production and consumption regulations. The production policies involve the acceptance of the commercialization of GM crops and foods and the regulations aimed at managing the potential risks associated with their production. For instance, the U.S. has three domestic bodies charged with the management of the various aspects of the genetically modified crops (National Academies Press 118). While the (FDA) Food and Drug Administration deals with the market approval decisions, the Environmental Protection Agency monitors the implication of the crops to the environment. The U.S. Department of Agriculture also regulates the introduction of new crops into the environment by critically analyzing its potential harms to the environment and biodiversity.

In the global perspective, the EU has the most stringent anti-GM food restrictions. All GM products are subjected to elaborate tests before they can be approved for human consumption as per the regulations of the (EFSA) European Food Safety Authority. The body, then reports on its findings to the European Commission (EC) after drafting approvals or refusals. France and Germany are the leading anti-GMO campaigners in Western Europe (Regis and Tracy, 29).

However, the EU is increasingly showing signs of softening its stance with respect to the approval of GM crops and foods. By December 2013, the EU had approved forty-nine genetically modified crops that included maize, oilseed rapes, soybeans, and sugar beets (FSA).

## **Evaluation of the Global Response to the Risk of GMOs**

The global risk to the potential risks posed by GM foods has impacted heavily on world food security. With the global population anticipated to reach about nine million by 2050, rapid measures that include the use of GMOs are considered as necessary in providing enough food for the world population. Even though, to those opposed to the use of genetically modified foods, the move is entirely unnecessary as the same could be achieved even without risking the safety of humans and the environment by emphasizing on organic agriculture (National Academies Press 90).

The potential health hazards posed by the consumption of genetically modified foods are considered more serious than issues of food security that could be solved through other approaches.

One of the positive implications of the global anti-GMO campaigns and regulations is that the assessment of the safety aspects of these foods is taken seriously. For instance, the restrictive measures of the EU have resulted in the formulation of efficient systems of checks and balancing aimed at ensuring the safety of the public before the GM foods could be approved.

## Conclusion

Globalization has a two-fold implication in the spread and use of genetically modified foods. The liberalization and lifting of trade barriers have impacted significantly on the spread of GMOs from countries such as the U.S. to the rest of the world. On the other hand, globalization has resulted in the divergence of both the restrictive and permissive approaches to the adoption of genetically modified foods that has led to polarization. Several domestic and international entities have emerged and developed regulations aimed at controlling the spread and use of GM foods. The EU is one of the global entities that have stringent restrictive policies forged to address the various concerns raised against GM foods. The uncertainty about the potential implications of GM foods on human health and the environment have been central concerns raised by majority of those opposed to the GMOs. Several benefits have also been highlighted by those in support of the integration of biotechnology into farming. These include the increased productivity as well as the possibility of alleviate poverty and bring about food security in the developing world.

## Recommendations

Much of the controversy surrounding the consumption of GM foods emanates from the uncertainty of their potential health effects. For this reason, a lot of resources should be invested in scientific research aimed at determining the real threats that these foods pose to human health. In addition, a lot of emphases should be put towards reducing the adverse effects of GMOs and enhancing their strengths considering that it is only through technology that the world will achieve food sufficiency (Lyon, 1752).

Based on the existing evidence on the possibility of having adverse health effects, GM foods should be adequately assessed for safety by powerful global entities such as the EU and aAU. These assessments should be thoroughly conducted before they could be authorized in member countries. By exercising this amount of caution, the potential risks of GM foods on human health could be efficiently mitigated.

## References

1. Boccia, F., and Vijay G. *Consumer Perspectives of GMO*. 2nd ed., Bradford, West Yorkshire, Emerald Group Publishing Limited, 2016,.
2. Danone. "Danone's Position on Biodiversity and GMO Use." 2016: 1-2.
3. Edwards, Sachi. "Avoiding Genetically Modified Foods In GMO Ground Zero: A Reflective Self-Narrative." *Journal of Health Psychology*, vol 20, no. 5, 2015, pp. 500-510. *SAGE Publications*, doi:10.1177/1359105315573451.
4. Ekin, Birol, et al. "Investigating the demand for Biofortified seeds in developing countries: High-iron pearl millet in India." *Journal of Agribusiness in Developing and Emerging Economies* (2015): 24-43.
5. Fairfield-Sonn. "Political Economy of GMO Foods." *Journal of Management Policy and Practice* (2016): 60-70.
6. Gilbert, Natasha. "A Hard Look At 3 Myths About Genetically Modified Crops." *Scientific American*, 2016, pp. 35-41.
7. GMOFAQ "Where Are Gmos Grown and Banned? #GMOFAQ." *GMO FAQ*, 2015, <https://gmo.geneticliteracyproject.org/FAQ/where-are-gmos-grown-and-banned/>
8. Hall, C. and Moran, D. 2014. Investigating GM Perceptions: A survey of Anti-GM and Environmental Campaign Group Members. *Journal of Rural Studies*, 22, pp.29-37.
9. Komparic, Ana. "The Ethics of Introducing GMOs into Sub-Saharan Africa: Considerations from the Sub Saharan African Theory of Ubuntu." *Bioethics* (2015).
10. Lyon, Jeff. "Nobel Laureates Pick Food Fight With GMO Foes." *JAMA*, vol 316, no. 17, 2016, p. 1752. *American Medical Association (AMA)*, doi:10.1001/jama.2016.11571.
11. National Academies Press. *Genetically Engineered Crops: Experiences and Prospects*. Washington DC: The National Academies Press, 2016.
12. Nodoushani, Omid, Jayme Sintay and Carol Stewart. "Genetically Engineered Food and Genetically Modified Organisms." (2015): 136 - 142.

13. Paarlberg, R., "GMO Foodss Crops: Africa's Choice." *New Biotechnology*, vol 27, no. 5, 2010, pp. 609-613. Elsevier BV, doi:10.1016/j.nbt.2010.07.005.
14. Robinson, C, and James M. Leonhardt. "Consumer Innovativeness and Loyalty To Non-GMO Foods: The Role Of Cognitive And Affective Beliefs." *Journal of Food Products Marketing*, 2016, pp. 1-17. Informa UK Limited, doi:10.1080/10454446.2017.1244789.
15. Rzymiski, Piotr, and Aleksandra Królczyk. "Attitudes Toward Genetically Modified Organisms In Poland: To GMO Or Not To GMO?." *Food Security*, vol 8, no. 3, 2016, pp. 689-697. Springer Nature, doi: 10.1007/s12571-016-0572-z.
16. Regis, N., and Tracey B. *Genetically Modified Crops And Food*. 3rd ed., New York, Britannica Educational Publishing, 2016.
17. Shetterly, C. *Modified*. Farmington Hills, Mich., Thorndike Press/Gale Cengage Learning, 2017.

Access this Article in Online	
	Website: <a href="http://www.ijarbs.com">www.ijarbs.com</a>
	Subject: Biotechnology
Quick Response Code	
DOI: <a href="https://doi.org/10.22192/ijarbs.2017.04.11.007">10.22192/ijarbs.2017.04.11.007</a>	

How to cite this article:

Khalid Hamdan Alotaibi. (2017). Globalization of Genetically Modified Foods and their Effect on Human Health. *Int. J. Adv. Res. Biol. Sci.* 4(11): 49-54.

DOI: <http://dx.doi.org/10.22192/ijarbs.2017.04.11.007>