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Genetically Modified Food: Yes or No?

Mohammad Hasan Sheikhha; MD, PhD¹

¹ Research and Clinical Center for Infertility, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

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Corresponding author:

Boali Street, Research and Clinical Center for Infertility, Shahid Sadoughi University of Medical Sciences, Buali Street, Yazd, Iran

sheikhha@ssu.a.c.ir

sheikhha@yahoo.com

Postal code: 8916877391

Tel: +98 35 38247085

Biotechnology is a very important industry in the world. There are many applications for the biotechnology; in fact this technology is used to make new or better products in every industry such as pharmaceuticals, textiles, chemicals, household products, and food processing (Raju, 2016). Considering the importance of food in human life and health, there are many questions on application of biotechnology in agriculture and food production. As a result, different opinions are expressed in different countries about these questions and consequently there are different policies applied by governments about genetically modified foods (GMFs) and crops (GMCs).

GMCs were first introduced in 1994 (Bohanec *et al.*, 2017). The first GMFs which had insect resistance and herbicide tolerance were commercially planted by United States, Canada, Argentina, Mexico, China, and Australia in 1996 on 1.7 million hectares. This was increased more than a hundred-fold to 175 million hectares in as many as 27 countries, including 19 developing countries in 2013.

Iran was added to the list of countries growing commercial GMCs in 2005. Interestingly this rapid growth was significantly higher in developing countries than in industrial ones. It was estimated by the International Service for the Acquisition of Agri-biotech Applications (ISAAA) that more than 90% of the 18 million farmers who planted biotech crops in 2013 were small farmers of the developing countries (James, 2015), while this rate was only 38% in 2006 (James, 2006).

Although, 20 years have been passed from the introduction of GMFs, they are now a big part of food products worldwide, and many experiments have been conducted in this realm, the production, trade, and marketing of genetically modified products (GMPs) in the European Union (EU) are still strictly regulated. EU has been relatively cautious about this matter and applied a regime label on GMPs. In addition, each country in Europe can apply a ban on introduction of new genetically modified strains; therefore, GMFs are banned in many European countries. This is mostly

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because there is no official permission by the government authorities in most of these countries. The more fundamental reason is now a fear arisen from biological safety of these products. This shows that application of biotechnology in production of GMFs needs a very careful examination before allowing them to release in the market. Further, releases of genetically modified insects for disease control can be mentioned as an example. While its trial has been conducted in the Caribbean, Malaysia, and Brazil, but it is not allowed in any European countries. It is interesting to know that the only active European genetically modified insect was olive fly that was allowed to release because the regulators in EU requested additional experiments before its application, it had high cost and was withdrawn two years after submission, in 2015 (Panjwani and Wilson, 2016).

There is no doubt that GMFs represent a potential solution for the world's food crises, but in the meantime they have potential risks for human health and environment (Gurău and Ranchhod, 2016). Some of the risks and benefits of GMFs can be listed as follows: health risks; environmental hazards; moral and ethical considerations; the potential for a reduction in world food shortages; reduced use of chemicals in crop production; and potential for improvements in the nutritional content of foods. Some researchers believe that GMFs are hazardous to the environment, while others believe that there is no evidence for this claim. Developing GMFs become easier and faster nowadays by using new technologies. There is no doubt that appropriate risk assessment is necessary for developing GMFs, but this fact must be considered that by focusing only on poorly defined biological risks of these products, scientists and academic organizations will be discouraged to involve in the studies related to biotechnology and GMFs production.

The public's misperception of the GMFs and GMCs' risks can result in their opposition against these products. In fact, consumers must have the right to choose between GMFs and non-GMFs. Publishing scientific researches on the possible benefits or risks of GMFs and GMCs can help

them to make decision. Giving correct information to people about new technologies is effective on their decisions, in fact; only when people have acquired relevant information about technologies, they form their attitudes towards it. Therefore, because this technology is relatively new in Iran, more studies are needed for assessment of people's knowledge and awareness on biotechnology. Any assessment about application of GMFs should consider the optimal balance of risk and benefit, not risk alone. It is also crucial for people to trust the source of their information.

Biotechnology has many proven potential benefits especially in agriculture where the GMFs are produced. The author published a paper in 2006 when this subject was still not a hot discussion in Iran and mentioned the importance of increasing public knowledge about biotechnology. In that study it was showed that 95.2% of people demand more information about GMFs and biotechnology (Sheikhha *et al.*, 2006). Now after 10 years; it is the center of many debates at present especially in the social media and groups. Information provided by media are of great importance since they can shape people's perceptions. In fact negative media especially when people trusted them can have negative effects on this promising new technology. It must be noted that producing GMFs in Iran is at a critical point in terms of public acceptance and spending huge amounts of time and money on this new technology means nothing without public acceptance.

There is no doubt that the risks of using GMFs must be weighed against their benefits. Provision of relevant education and information to people is thus necessary. To do this, approaches conducted in Iran cannot be the same as other countries due to different cultures. As it was mentioned in the author's previous paper, before production and distribution of any GMFs, people must be educated since informed public can make informed decisions. Moreover, this training needs collaboration among the government, industry, and universities.

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