Genetically Modified Organisms

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Abstract

Genetically Modified Organisms have been around two decades, and they are considered safe for human, but on the other side, other studies show that GMO have some risks and deleterious effects on animals, GM food just like any new drug requires many tests to prove that these new organisms are safe for human and can exist in the markets. Ongoing independent studies to evaluate safety are needed. Scientific, economic, environmental, social, ethical, and political perspectives will need to be considered.

I. Introduction

Genetically Modified Organisms (GMO) are organisms whose genetic information (DNA) has been changed by inserting a gene from another organism to give specific functions that it cannot do before this technique called "modern biotechnology" or "gene technology", which improve the yield through introducing resistance to plant diseases or of increased tolerance of herbicides, GMO can also allow for reductions in food prices through improved yields and reliability [1]. There are a lot of Genetic Modification Organisms that have been developed in recent time, all of them are inserted by genes from another organism for example the BT corn, a Bacteria called Bacillus thuringeinsis (BT) produce a protein toxic to the larvae of certain insects, such as the European corn borer. These Insects are found widely in Europe, North Africa, Canada, and most of the United States. These insects reduce the yield by 5%. The Bt corn is the corn that had the BT gene from Bacillus thuringeinsis inserted into its cells. This gene provides information that causes the plant cells themselves to produce the Bt protein. As a result, the offspring of the modified plants are protected from the corn borer.

II. How does the process of genetic engineering happen?

i. DNA isolation:

The needed gene is determined then they isolate the DNA from the organism that contains this gene by breaking the cell structure and this often happens physically by smashing the organism y, then protease (protein enzyme) is added to degrade DNA-associated proteins and other cellular proteins. After that the DNA separate by adding alcohol by this process all the cell material precipitate while the DNA become at the top and it will appear like white cotton.

ii. Use the plasmid as a vector:

A restriction enzyme is DNA-cutting enzymes. Each enzyme recognizes one or a few target sequences and cuts DNA at or near those sequences, this enzyme used to cut a specific sequence from the gene that has the needed treat, then the same restriction enzyme is used to cut the plasmid which is used as a vector to enter the gene to the organism, then the plasmid inter the organism by using a gene gun. After this process the cell will contain the foreign gene and when the cell division accrues the new daughter cells will contain this gene.

III. What are the benefits of GMOs?

GM foods are developed because of some perceived benefits to the producers and the consumers The World Health Organization (WHO) and the United States Department of Agriculture (USDA) have outlined a comprehensive list of the
benefits of GM foods. This list is discussed below.

i. Insect resistance:

Agricultural biotechnology has been used to make the plants insect resistant, this is achieved by introducing the gene of a toxin called Bacillus thuringeinsis come from BT Bactria, this toxin is considered for humans and it currently uses as an insecticide, the plants that uptake this gene become resistance against borer insects. This technology

makes the crop requires lower quantities of external insecticides. Such genetic modification can make crop production cheaper and more manageable, as well as make pest control safer. Additionally, there is decreased contamination of the groundwater and the environment from pesticides.

ii. Disease Resistance:

Some diseases can be resisted by using genetic modification organisms, as these crops resist some diseases better than the normal crops [7]. For example, when many diseases significantly threatened the Hawaiian papaya industry, the papayas were made disease-resistant through genetic engineering. This technology is expected to increase in the future, and it will be applied in many crops like potatoes, squash, tomatoes.

iii. Nutritional:

Some GMO can produce nutritionally enriched plants, as these organisms are uptake gene that will produce specific vitamin like golden rice, this rice is uptake biosynthesize beta-carotene gene, which is not normally produced in rice. The beta carotene gene is converted into Vitamin A when it is metabolized by the human body. Vitamin A is essential for healthier skin, immune systems, and vision.

IV. What are the risks of GMOs?

The world health organism has identified three main risks for the genetic modification organisms which are discussed below.

i. Allergenicity:

Some GM foods have the potential to cause allergic reactions, as the gene that is transferred to the food have the potential to cause allergic reactions, also another risk is introduced a new gene to the food that did not previously exist in the food chain [6]. Many, but not all, genes that are used in GM foods are novel and do not have a history of safe food use. An example of the allergenicity, GM soybeans that uptake a gene from the brazilin nuts, this gene is considered causative to allergic reactions in some people.to prevent this risk, the transfer of genes from commonly allergenic foods is discouraged unless it can be proven that the protein produced by the introduced gene will not be allergenic, also some tests happen to be sure that the introduced gene is not allergenic.

ii. Gene transfer:

Another risk for GMOs is the transfer of genetic material from the GM food to the human cells, the DNA that comes from GM food is not completely digested by the digestion system and small fragments of the DNA have been found in different parts of the gastrointestinal tract [3]. This could result in gene transfer by absorption of the DNA fragments by the somatic cells. Scientists hypothesize that uptake of GM DNA into the cells will have no biological consequences due to degraded of this DNA by the cells, However, it is not clear if people with gastrointestinal diseases will be able to completely degrade this GM DNA. An example for gene transfer, in Canada they found the BT toxin in 93% of the pregnant women tested.

iii. Outcrossing:

Outcrossing means that the genes of GM foods move to the natural plants or the related species, this could make other plants uptake unwanted genes that could cause health problems to the human and damage the plant itself [7]. To avoid this problem, farmers use buffer zones, pollen barriers, crop rotation, and monitoring during harvest, storage, transport, and processing to manage outcrossing.

V. Conclusion

GM food has numerous potential risks and benefits, many studies have shown positive and negative results for GM food. GM food has positive impacts on health, economic, environmental, and social. Corn is extensively used in processed foods and animal feeds, and GM corn now makes up almost the entire U.S. crop. GM soybeans are not far behind [4]. A team of Italian scientists has summarized 1,783 studies about the safety and environmental impacts of GM foods and did not find a single credible example demonstrating that GM foods pose any harm to humans or animals [5]. On the other side, GM food has many potential risks, to avoid these risks this technology must be studied and tested before this food becomes available in the market.

VI. References

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