

The Future of Food: With The Help of GMO

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Abstract

Genetically modified organisms are living beings that have had their genetic code changed in some way. The world population has doubled over the last 50 years and each year increases roughly by another 100 million people [2]. This raises concern about the earth's carrying capacity and where resources will come from. With the use of GM crops, there is a potential solution for this. This project investigates how GM crops are created, and how they affect the consumer and those growing them. Results indicated that there is no evidence proving GM crops have a negative effect on one's health, but instead an opportunity for enhanced nutrition. Crop yields and profit were increased in both first and third world countries, and pesticide use was decreased.

Introduction

In an ever-evolving world of climate change, overpopulation, and uncertainty, one thing remains: medical research and biotechnology. The use of GM crops in grocery stores is one of the most controversial topics in the food industry. Common questions that arise are:

- Can these crops potentially harm us?
- What goes into the process of the genetic engineering of these foods?
- With enough research and resources is this an opportunity to help world hunger?

Research and experiments performed lead to the hypothesis: If genetically modified food was accepted and consumed, then crop yields would be increased both in the US and underdeveloped countries, the use of pesticides can be diminished, and the impact on overall health by the consumption of these foods would have a neutral physiological effect with a future opportunity for enhanced nutrition and solution to world hunger.

Methods and Results

Genetically modifying a plant begins with insertion of the DNA into the nucleus of a single plant cell. There are two common ways that this is done[4]:

- The **Agrobacterium tumefaciens method** (Figure 1) inserts the gene of interest into a virus or bacterium, transfers the new DNA from the bacterial cells to the plant cells, the plant cells replicate, and the GM plant is created.
- The **Particle gun method** (Figure 1) uses tiny metal particles that can be covered with the specific gene fragments needed, that then raid the plant cells and produce a new GM plant.

GM technology has remarkably increased crop yields and farmer profits over the past 20 years [2]. Statistics proved:

- A 22% overall increase in yield of GM cotton, maize, and soybeans
- A 68% increase in farmer profits
- A 37% decrease in pesticide use on crops
- Farmers in developing countries with an increased yield of 14%
- Farmers in developing countries with profit gains of 60%
- In 2012, the direct global farm income benefit was \$18.8 billion
- Since 1996, farm incomes have increased by \$116.6 billion

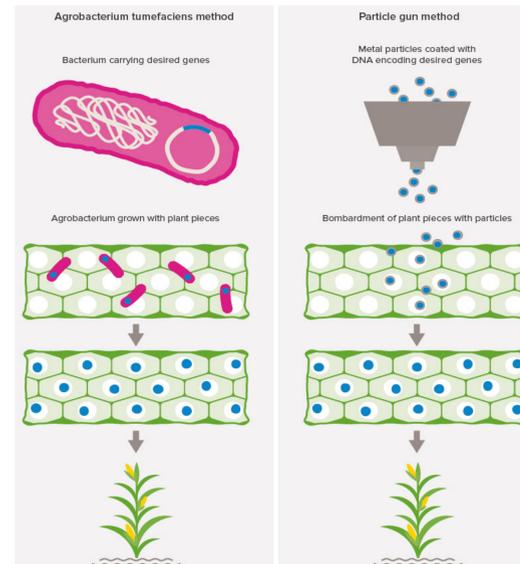


Figure 1: Agrobacterium tumefaciens method and Particle gun method [4].

In Bt corn or (Bacillus thuringiensis corn), proteins called "Cry toxins" are produced [1]. These proteins:

- Have been used for over a century in farming
- One of the safest insecticides known
- Found mostly in leaves of corn, not kernels
- Insects are killed when they consume, eliminating pesticides completely
- Sprayed on non-GMO organic produce, same protein ingested regardless

Discussion

GMOs have undergone more intensive research than any other plants we consume. Some limitations of the study make moving GM crops to a global scale a bit more difficult. Most developing countries do not have adequate resources to invest in the biotechnology required to increase their agricultural productivity, in the short period of time needed to keep up with the increasing food demand and skyrocketing population [3]. To help with this, countries have agreed to donating the technology needed in these underdeveloped countries, and many already have. Another limitation of the study is the ethical concerns individuals and environmentalists have against all things GM. All that can be done to take the next necessary steps is to continue research to prove that these crops are made to benefit the world rather than harm. In conclusion, there is no reliable evidence to prove that the consumption of these organisms is bad for human health. GM crops provide hope for developing countries and malnourished individuals can finally have the food and nutrients needed.

References

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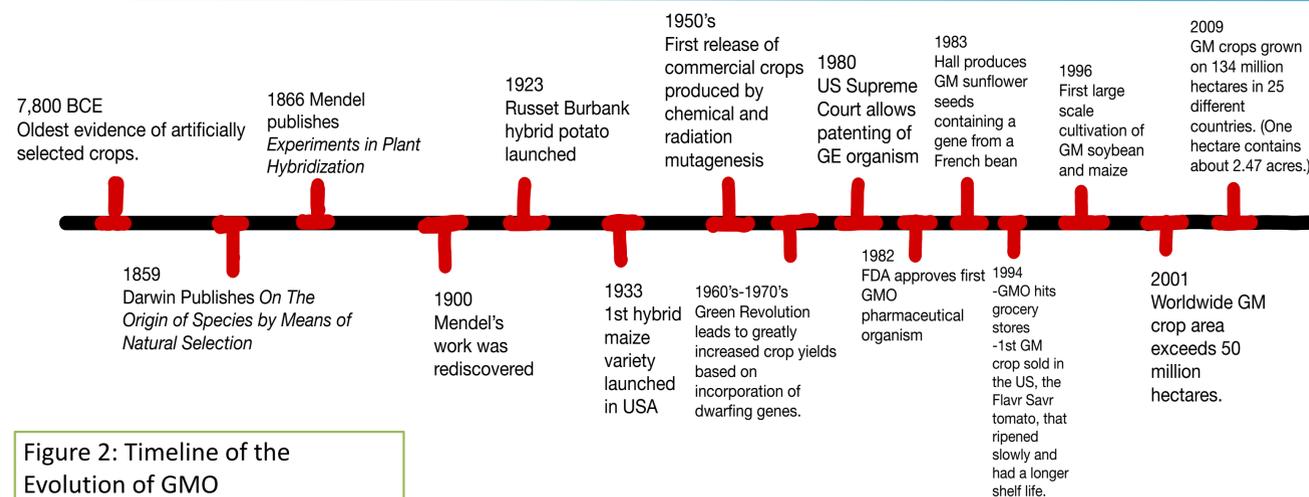


Figure 2: Timeline of the Evolution of GMO

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