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Is genetically modified food fit for global consumption?

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Genetically modified organisms are defined as follows according to the World Health Organization (2015),

Genetically modified organisms (GMOs) can be defined as organisms in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating and/or natural recombination. The technology is often called “modern biotechnology” or “gene technology”, sometimes also “recombinant DNA technology” or “genetic engineering”. It allows selected individual genes to be transferred from one organism into another, also between nonrelated species. Foods produced from or using GM organisms are often referred to as GM foods.

Bt crops are considered by the International Service for Acquisition of Agri-Biotech Applications (2015) as,

... [Bt is] responsible for the production of the insecticidal protein from the bacterium and incorporated it into the genome of plants. Thus, these plants have a built-in mechanism of protection against targeted pests. The protein produced by the plants does not get washed away, nor is it destroyed by sunlight. The plant is thus protected from the bollworm or the corn borer round the clock regardless of the situation.

Genetically modified food is fit for global consumption because it can enhance nutrients, and yield a larger number of crops, yet some do believe that genetically modified foods can disrupt the environment and harm human health.

First and foremost, genetically modified food is fit for global consumption because it can have enhanced nutrients. According to Charlotte Ashton (2013),

1.7 million Filipino children suffer vitamin A deficiency - which reduces immunity and can cause blindness...rice has been genetically modified to produce beta-carotene. The body converts beta-carotene into Vitamin A and scientists estimate that one cup of Golden Rice [GM rice in the Philippines] will provide up to 50% of an adult's recommended daily intake. The rice has been engineered so that the precursor chemical is expressed in the edible grain.

Ashton is a journalism graduate from the University of Oxford, and is a reporter for BBC News and writes on genetically modified foods, nevertheless she does report for profit.

Lack of nutrition is a growing problem in developing countries. Hunger and poverty is often the defining point between a developed country and a developing country. In this sense, genetically modified foods can largely benefit the growing human population that is living in poverty.

To further examine GMO nutrition in Uganda, Andrew Kiggundu (2015) states,

A genetically modified (GM) banana with six times the normal level of vitamin A could be widely available in Uganda in five years' time to help solve the country's nutritional problems...52% of children under the age of five in Uganda suffer from vitamin A deficiencies leading to considerable stunting. Iron deficient anemia accounts for 40% of deaths among this age group and 30% of deaths in pregnant women.

Kiggundu has a PhD in plant biotechnology, and is the principal research officer at the National Agricultural Research Organization in Uganda, but Kiggundu does receive funding from USAID as well as the Bill and Melinda Gates Foundation.

This clearly shows how genetic modification can change the world. Without genetically modified foods, whole communities have the chance to continue to go hungry. When less economically developed countries (LEDCs) are in need of an alternative to organic crop growing, which is considerably more strenuous and expensive, they should indeed look to genetically modified produce. Genetically modified food, in this sense, has the potential to solve the global malnutrition and hunger epidemics.

Furthermore, GMOs are fit for global consumption because they have a higher crop yield. Samantha Spooner (2015) examines this in Africa,

As a result of over 20 years of joint breeding efforts between the National Agricultural Research Organization of Uganda (NARO) and the IITA, last year there was the distribution in East Africa of the first-ever, high-yielding and disease-resistant hybrid varieties of Matoke. With nearly 60% higher yield than the local "matoke", these hybrids are also resistant to black Sigatoka, a notable fungal disease of the crop worldwide that affects the leaves and leads to losses of 30--80%.

Spooner is versed in African studies, is the editor of Mail & Guardian Africa, and has many published pieces on nutritional needs in Uganda; nevertheless Spooner does have an emotional interest in the topic.

The matoke, being a staple crop similar to a banana, is crucial to the developing Ugandan government. Advancements made in agriculture would provide it with a valuable export as well as a vital food for its own people.

In addition to the matoke, Sun and Guillaume (2012) make an observation on Bt crop yields in India,

...contribution of Bt cotton adoption to long-term average cotton yields in India using a panel data analysis of production variables in nine Indian cotton-producing states from 1975 to 2009. The results show that Bt cotton contributed 19 percent of total yield growth over time, or between 0.3 percent and 0.4 percent per percentage adoption every year since its introduction...increased adoption of hybrid seeds appear to have contributed to the yield increase over time.

Sun and Guillaume both are versed in the topic of genetic modification statistics, Guillaume is a researcher for the French Association of Environmental and Resource Economists, while Yan Sun is a professor on biomedical engineering with a PhD on the subject, nevertheless both of these authors show a jaundiced view towards biotechnology being used in crops.

Due to the massive amount of genetically modified crops produced, it is evident that local economies as well as major corporations would benefit from this. Local growers in LEDCs can now not only grow crops that are higher in nutrition, but can also have a higher crop production which would result in less food shortages and a higher profit margin for the growers. It is also foreseeable that with the advancement of crop yield due to GMOs, countries and other economies will become more self sufficient which would result in less conflict due to trade, tariffs, and government taxes.

Conversely, some experts do argue that genetically modified foods are not fit for global consumption because they harm the environment. A quote from Haspel (2015) shows this,

One definite negative is that herbicide tolerance in genetically modified organisms has hastened the development of glyphosate-resistant weeds. Not only does that mean farmers have to turn to other herbicides or, possibly, to tillage, it means that the widespread deployment of genetically modified crops has undermined the effectiveness of a very effective, relatively safe herbicide.

Haspel is a writer for The Washington Post and studies food politics, as well as having numerous publications on The Genetic Literacy biotechnology website, while on the other hand Haspel does discuss her pro-stance on genetic modification technology.

Parallel to this quote, it is widely known that once the environment is negatively affected, a chain reaction begins. Farmers seek solutions, such as tillage, to solve this issue. But, tillage can cause a wide range of problems such as soil erosion and uprooting of plants that provide the earth with nutrients. Likewise, the herbicides used with genetically modified foods which cause special herbicide resistant weeds disrupt the environment, it may permanently damage food supply and seed. This may ultimately cause the world to go hungry.

It is also evident that genetically modified foods harm the environment through this quote form Gene Watch (2015),

The majority of GM crops being grown worldwide are tolerant to Monsanto's weedkiller, Roundup, or Bayer's weedkiller, Liberty. The companies making the chemicals also sell the GM seed. However, in North America - where GM soybean, cotton and maize are grown on thousands of acres - the use of weedkillers has not been reduced. Sales of Roundup and Liberty have increased and new factories are being built to make more.

Gene Watch is a nonprofit organization located in the United Kingdom that focuses on genetic engineering whose staff consists of specialized experts, although they do confess their purpose to advocate for public interest and human rights.

Herbicide tolerance as well as super weeds (which are referenced in the above quote) can devastate a farming community and extremely hinder a country's exports. Local farming communities can be left with areas in dire need of fresh crops, and farmers themselves would be left without a way to accumulate profit and sustainability.

In addition to genetically modified foods harming the environment, it can also be shown that these foods are not fit for global consumption because they can negatively affect human health. According to an article written in the Gale Database (2008),

...in 1989 there was an outbreak of a new disease in the United States, contracted by over 5,000 people and traced back to a batch of L-tryptophan food supplement produced with GM bacteria. Even though it contained less than 0.1 percent of a highly toxic compound, 37 people died and 1,500 were left with permanent disabilities. More may have died, but the American Centers for Disease Control stopped counting in 1991...

Gale is a worldwide education oriented database that is used by school districts globally, and it provides articles from scholars and professionals who are highly versed in the subjects they are writing about, however, this specific article is a bit outdated.

In addition to this, Ethan A. Huff (2011) writes,

The pesticides and herbicides used to treat genetically-modified organisms (GMO) are showing up in significant amounts in rainwater, water wells, and even mothers' breast milk, according to new research out of Brazil. Particularly among residents living near massive GMO monoculture operations, research reveals that 100 percent of women tested positive for at least one agrochemical in their breast milk, and cumulatively tested at agrochemical levels much higher than what is even permitted in cow's milk.

Ethan A. Huff is a writer and editor for Natural News, and specializes in writing about genetic modification and nutrition, although he does partial views against GMOs.

Human health is, without a doubt, a major downfall of genetically modified foods. With evidence of fatal chemicals showing up in the breast milk of new mothers, it is quite possible that there are other negative effects. Also, people living in these areas that are widely exposed to chemicals used in genetically modified crop fields that can cause lethal diseases.

While beginning my research with genetically modified foods, I had not yet formulated an opinion on the subject. Due to this, I began the research process cautiously to attempt to formulate my own thoughts before coming to a conclusion on the matter. With the commencement of my studies, I resulted that I have nothing particularly against genetic

modification. But, with seeing the various chemicals used in genetic engineering, the alternate perspective that they are not entirely beneficial is not uncalled for. Because of the possibility of decrease in biodiversity and the appearance of chemicals in new mothers, the opposition of genetically modified food proposes a valid disagreement. But, with further research that includes long term studies on willing humans in LEDCs and MEDCs alike, knowledge of the effects will grow. Also, where food supply is needed, in places like Uganda, trials of the foods suggested must be done so that ultimately this country and others in its position can make an educated decision on whether the acceptance of the products modified specifically to benefit them are a good fit for the countries' agricultural economic and health interests.

Genetically modified food is suitable for worldwide consumption due to the arguments that it enhances nutrients, and yields a larger quantity of production, while it can also be argued that modified foods are not fit for global consumption because they can put the environment and human health at risk.

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