

The genetically modified foods biology essay

[Science](#), [Biology](#)



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The Big Bad Wolf in Disguise: Genetically Modified Foods

Global population has grown to nine billion since man's simple beginnings, "increasing food insecurity" (Turk & Bensel, 2011). People today are overworking and caring for their families until they forget about the suffering world. The only cognizant connection people make is usually when natural disasters affect underdeveloped countries like Haiti fighting for survival. In their search to create larger yielding and ecofriendly crops, scientists are developing a myriad of genetically modified (GM) foods. Nevertheless, some individuals fear consuming GM foods, primarily because they do not understand the effects it may present to various organisms. As revealed in this paper, independent scientific studies show that it is not safe as originally thought. Although some scientific studies state GM foods are safe and increases global food supplies, it is the opinion of this paper that it poses serious risks to the welfare of humans, animals, and the environment requiring prohibiting further use.

Advancement in Genetic Modification

Genetically altering foods is one of the most controversial subjects across the globe today. As understood, the basic explanation of genetic engineering is extracting a select gene from one type of organism and infusing the material in a dissimilar organism creating a hybrid (Turk & Bensel, 2011b). Veterinarians perform the more common method of animal modification through traditional or artificial insemination for the purpose

producing more livestock. Since discovering horticulture over 100 years ago, man has crossbred ornamental flowers and vegetation the slow traditional way, which is by grafting a small section from particular species to the host producing new types of vegetables and fruits. Increasing global hunger is the drive behind developing new plant species increasing crop yields through genetic alteration (Turk & Bensel, 2011b).

Advantages of Genetic Modification

Genetically Modified Crops to the Rescue. It goes without saying that poverty and starvation is not a respecter of persons, especially in underdeveloped countries. Scientists find the breakthrough by developing genetically modified grain with the purpose of saving lives by producing greater yields. Many people around the world are shocked upon hearing media reports of the locust invasion that is of Biblical proportion in the regions of Egypt and Israel on March 5, 2013 (Miller, 2013). It is pest invasions such as this that support the development of first-generation GM crops resistant to insects, herbicides, and diseases, also helping the environment by using fewer chemicals. Scientists infuse, for example, corn and soybeans with the gene from specific herbicides allowing farmers to use fewer and less expensive products to weed crops (Qaim, 2010). One genetic infusion is the *Bacillus Thuringiensis* (Bt) component killing larva that feast upon vegetable and grain bearing crops (2010). Nutrient Deprived Soil Create Poor Crop Yields. There are certain situations exacerbating hunger such as poor farmers relocating to marginal lands, as in the case in colonizing undeveloped countries (Rosset, 2005). Explained by Turk and Bensel, when farmers overwork soil they further deplete the few remaining nutrients resulting in

poor crop yields (2011c). Poor soil conditions create the need for farmers to increase amounts of irrigation water and additional chemicals to replenish nutrients and kill pests. It is undeniable that excessive use of chemicals threatens abiotic and biotic dynamics, ultimately harming humans. Studies further reveals the cause of Red Tide killing aquatic coastal life in the Gulf of Mexico is due to excessive nitrogen runoff. The combination of the aforementioned issues support scientists' development of crops that are resistant to extreme cold, heat, and saline conditions (Turk & Bense, 2011d). Second-Generation Alterations. Second-generation GM foods are those containing genes augmenting the quality of meat and poultry for human consumption. Genetically modified foods are not restricted to vegetation, grain, or fruit. For example, some GM foods consist of beef, pork, poultry, fish, and shrimp. Society knows by now that many cattle producers introduce growth hormones to Angus cows to produce larger than normal animals for the best quality of meat for human consumption. Some people may be surprised to find that the extra-large turkey breast they purchase from the grocery store is the result of modification. Countries depending upon fresh and saltwater aquatic life as a vital food and economic source are quickly depleting many species. In an effort to avoid extinction researchers are genetically modifying salmon, trout, shrimp, and other aquatic life. Commercial fisheries restock with these new species to increase food supplies although it may not be enough to keep up with the growing demand. Third-Generation Genetic Modifications. Experts are currently developing third-generation GM crops for medicinal and bio-fuel productions (Schneider & Schneider, 2012). Other benefits of genetic modifications are

plants containing higher levels of food nutrients (vitamins and minerals) and those possessing properties essential for medicinal or industrial use (Qaim, 2005). Biotechnology Affairs Director for Pioneer, Steve Daugherty explains, "... by increasing molecular knowledge, it becomes easier to develop changes in GM crops to the public's advantage" (as cited by Jagger, 2008a). Physicians are hopeful that enhancing crops with vitamins and minerals will decrease illnesses due to conditions such as vitamin A deficiency. Successful integration of the hepatitis B vaccine into potatoes and lettuce will be useful to eradicate this disease (Key, Ma, & Drake, 2008). To help doctors understand genes that run amuck creating cancer and other diseases, scientists genetically alter mammals to introduce traits imitating human illnesses. One amazing GM contribution made in the field of medical science is generating animal organs to use as human transplants to save lives (Lewis, 2001). Protecting the Environment. Genetically modified crops usually contain a singular gene trait that allows them to survive applications of chemical plant killers and pest infestations. Because farmers use fewer chemicals, it decreases the use of farm equipment and fuel lowering soil and ground water contaminations. However, researchers are developing crops containing several gene traits rather than one to provide a myriad of benefits for society and the ecosystem. Because farmers suffer more often from chemical poisoning, by using fewer chemicals they will see lower medical costs. One excellent advantage for the environment is that by applying chemicals less often " the carbon footprint of growing crops will also decrease" (Jagger, 2008b). Ultimately, this means less greenhouse gas emissions in the atmosphere to protect the environment. Economic Growth

Opportunities. Poor farmers will be able to profit financially because of fewer applications of pesticides, herbicides, and chemical fertilizers. These savings will revert to consumers through lower food costs due to increasing food availability; thus the increasing food security. Farmers have an additional opportunity to increase their financial returns by lowering labor and fuel consumption. As more countries become receptive to growing and consuming GM foods, the market will expand for global trade to improve the overall economic health of a country. Current developing countries will see an increasing global trade; thus improving their gross national product. Another advantage of genetically altering food and animal products is the ability to maintain its freshness longer and providing extended shelf storage. This means that vegetables will ripen slower enabling longer transportation of products and reducing spoilage.

Dangers of Genetic Modification

Danger to Indigenous Crops and Wild Flora. One claim that gene traits from GM crops will not spread to native vegetation is incorrect according to further studies. Researchers from Berkeley University prove the opposite is true in one Mexican town (Shapiro, 2002a). This is the result of one farmer deciding to plant a few GM corn seeds to see if it would be better than her native maize. After testing the farmer's crops, researchers discover evidence of genetic alteration in the native maize (2002b). This evidence prompts researchers to test additional native crops from nearby communities at which time they discover crosspollination occurring through nature's normal process. Latinos value their heritage; therefore, this discovery has a devastating effect upon the integrity of their native crop

(2002c). Adverse Effects of Genetically Modified Foods in Animals. In 2008, a group of researchers conducts studies revealing the short-term effects of GM plants fed to animals and its side effects to humans. Even though properties of GM plants dissolve in animals' intestines, tests reveals that piglets now have lower immune systems (Walsh et al., 2008). Evidence reveals that cows given growth hormones develop more cases of mastitis " requiring increasing amounts of antibiotics leading to more antibiotic-resistant bacteria" (American Cancer Society, 2011). The Food and Drug Administration finally releases for public review a memorandum from Dr. Fred Hines that reveals conclusive pathology results that in two out of three lab tests, rats develop stomach and mouth lesions when fed transgenic tomatoes (1993). In a separate long-term study, one group of rats consuming only GM corn gain excessive amounts of fat while a second group eating non-GM corn gain little to no weight (Main, 2013). This leads to a possible link between human obesity and GM foods warranting further analyses.

Impact on Insects and other Organisms. As more farmers plant GM crops, the real threat is the growing population of insecticide resistant pests. Organisms have a natural process in which they evolve to adapt to changes in the environment to survive. One primary cause for concern is predatory insects that naturally protect crops by killing and feasting upon crop-destroying pests. Another issue of concern is the cross-pollination of GM crops with weeds to create herbicide resistant strains taking over food crops. Both of these situations require farmers investing in more effective and stronger chemicals to kill pests and weeds. Here again the cycle of harming the environment and freshwater supplies will start anew. This

defeats researchers' original goal of eliminating excessive applications of insecticide and herbicides by developing GM crops. To reference the recent Egyptian locust swarm, these types of insects could eventually become resistant to the pesticide component in GM crops destroying valuable food sources. Adverse Impact on Economic Growth. Many countries are leery of claims that GM foods are safe for human and are good for the environment. Rather than relying upon seemingly biased studies of North American scientists, other countries conduct their own studies resulting in several contradictions. One important outcome is that developing countries must conduct risk assessments determining the financial feasibility for poor farmers since GM seeds are costly to purchase. Conducting risk assessments for safety, environmental feasibility, and methods to transport food is an expensive process for any country, which many undeveloped countries cannot afford. Several European countries refuse to import GM foods, defeating the purpose for undeveloped countries to grow genetically GM products in expectations to grab a share of global marketability. Ethical and Regulatory Concerns. Genetic modification is completely unnatural and crosses into the area of playing the proverbial "mad scientist" under the guise of curing world hunger. While one scientist genetically alters crops, another researcher clones the infamous sheep, Dolly in 1996. Lassen, Gjerris, and Sandøe explain that Dolly's cloning creates prevalence for the development of ethical limitations (2006). Take for instance turkeys modified for their oversized breasts that many individuals love to consume on special holidays. Because of the gross modification in these birds' anatomy, they are unable to stand on their legs allowing them to defecate

and interact with other turkeys. Yes, it is true that many countries regulate cloning practices, but this does nothing to protect the integrity of animals and other organisms against cloning practices behind closed doors. Another example is a Canadian scientist who "bred a blind egg-laying hen" solving the problem of behaviors of free-range chickens attacking one another, which incidentally interferes with nature's competitive forces (2006).

Pecking is the natural habits of birds and a way that nature weeds out the weaker of the species. Legal Issues: Innocent Farmers Caught in the Crosshairs. The cross-contamination of crops will become a legal issue on several grounds. Image this scenario: Farmer Joe plants organic crops and the wind carries pollen from Farmer Sally's GM crops five miles away contaminating Farmer Joe's crops. Farmer Joe advertises his crops as 100% organic vegetables for sale. A customer purchases beets from Farmer Joe and decides to confirm the authenticity of the organic nature by having it tested. When the results reveal cross-pollination, the customer sues Farmer Joe for false advertisement. However, the company that manufactures Farmer Sally's GM seeds also sues Farmer Joe for patent infringement. The truth is that Farmer Joe is the true victim in this entire scenario due to the pollination process by nature. If scientists genetically alter foods with components from nuts without notifying farmers prior to purchasing seeds, not only will this result in civil lawsuits for the manufacturer, it will also include farmers if a consumer is injured or dies as a result. Ultimate cost of Genetic Modification: Man's Own Identity. Many people fear the possibility of cloning humans, after all this was one of Adolph Hitler's ultimate objectives to create the perfect Aryan race. At the time of the terrorists' attacks on

September 11, 2001, this author was a Crime Intelligence Analyst for state law enforcement. The Unit Supervisor approaches each employee requesting a DNA swab for identification purposes. Although employees know this is a legitimate request in the event of an attack, there continues to be the feeling of surrendering personal identification markers. However, once surrendering DNA it becomes state property. To further support beliefs that genetic modification must be prohibited, currently there is a case before the Supreme Court, Association for Molecular Pathology v. Myriad Genetics, in which the decision as to whether human genes can be patented. Myriad Genetics is a medical diagnostics organization that isolates human DNA creating several forms of cancer. If Myriad Genetics wins this case for patenting human genes, the next step may actually be human cloning. This is a real threat to humanity disguised as medical research to cure diseases.

Conclusion

Although some scientific studies state GM foods are safe and increases global food supplies, it is the opinion of this paper that it poses serious risks to the welfare of humans, animals, and the environment requiring prohibiting further use. As a former analyst, this author is always suspicious of sources that only present advantages rather than providing both sides allowing people to understand the true issues. Yes, there is scientific evidence that GM foods are safe; however, is this biased information? It would also seem that producers of GM foods reap tremendous opportunities to increase their bottom line by providing appealing statistics to countries less willing to accept their products. Although some people do not feel the same, it is possible for individuals to manipulate statistics to gain public and

governmental confidence to invest in GM foods. Will future generations face human gene alterations by consuming GM foods? The worst scenario is the eventual cloning of humans to create a super race free of radicals causing illnesses and diseases. If this last scenario becomes reality, the entire balance of the ecosystem will crumble because man would consume everything on this planet. This paper continues to support the belief that genetic modification must not proceed further for the welfare of humanity and the environment.