Genetic Modification: Personal Viewpoint And Reflection

Initially, I was opposed to any form of genetic modification on the basis that if it did not occur naturally it should not be safe for consumption. I was not fully aware of the process and had done very little research, but it seemed unlikely that genetic modification could be a solution to the world hunger crisis. I believed that it would be a “disaster in the making” as the negative effects would outweigh the positives. I was under the impression that this was a dangerous process and would lead to a decline in a person’s health. I now understand that this may not be the case.

The process of genetic modification, which is also known as genetic engineering, entails the specific choice of gene from a specific organism and forcing that gene into another organism resulting in a precise alteration. This process of Recombinant DNA technology follows the method of insertion of one or many individual genes of one organism of one species into another’s DNA.

This is done in order to express the desired trait through the product. These alterations result in a transgenic organism, which is a genetically modified organism that carries a transgene. The transgene has the ability to code for various improvements and adaptations. More specifically the gene of the desirable trait of interest is targeted from another organism. Once the gene is targeted they isolate the genetic trait and decode what it is made up of. Once the gene has been decoded the trait is inserted into the desired genome which alters the genetic material of the original organism. Once this is completed the organism/s is watched to grow and develop.

The process of Recombinant DNA technology is still relatively new and being tested for hazardous side effects, however, they have yet to find one that will have a big enough impact on our health. This gives me hope that the process of improving the quality of our food and enriching them, starting with the basic necessities, could potentially be a solution. By adding vitamins and minerals to the foods, people will be able to lead a healthier life. People living in poverty and that are part of the food crisis will be able to eat less food while still getting their required nutrients. This for me is something that will change their lives. Less people will become ill or die because they will be able to get the right nutrients from the food they eat.

Another benefit of genetically engineered crops is they produce a higher yield of crops in a smaller space. This benefits the amount of land needed for farming and the amount of water or insecticide used. With the problems we are facing in our country regarding land and water this will help stabilize the economy and the inflation put on our food and ultimately become more affordable for people to buy the necessary foods. Moreover, insecticides will be reduced as crops can be genetically modified to combat infestations of bollworm. An example is seen with the gene from a bacterium- Bacillus thuringiensis which acts as a natural insecticide by producing Bt toxin, which is found in genetically modified potatoes and corn. These are staple products that underprivileged people live off. By doing this these crops can be produced between a 30%- 80%1increase in yield to that of non-genetically modified crop. This improvement saw a significant reduce of price, as less insecticide was used the expenses were less so therefore it could be sold at a lower price. Not only can they become resistant to pests but to weeds, acting like a herbicide. Not only does this cut down the cost on herbicides but it

also prevents soil erosion which protects the land for future farming to continue.

Genetically modified organisms provide better health benefits by tailoring the genetic profile of crops to be built with many vitamins and minerals. This allows people to attain nutritional substance at reduced prices and with less food needed which allows the underprivileged to maintain their health in a feasible manner. By genetic modification, crops have a longer shelf life. In this case it would be beneficial as food can be distributed to further locations around the world to help with the food shortage. Less land is needed to grow more crops. Larger yields can be produced in a smaller space. This results in increased amounts of food that can be distributed to meet food demands of populations. While taking up less space, they conserve resources that are running out. Energy, soil and water have been reduced as crops have been engineered to be grown in areas with less favorable conditions. Specifically with water, the amounts of it needed are significantly reduced. Less money is needed to be spent on herbicides and pesticides as they can be engineered to resist any threats, while also beneficial for our health without toxins sprayed onto our crops. This could mean that the genetically modified crops may be safer and healthier in my opinion.

Furthermore, most foods that are made of the commercialized core crops, including corn and soybeans, and approximately “90%”2 have had some form of genetic modification. The genetic modification of foods may lead to food intolerance or a heightened risk of obtaining an allergy to a certain food product. This may follow on to the effect that genetically modified plants contain seeds that may spread to and contaminate traditional plants due to pollination. Another side effect could be that genetically modified crops are fed to livestock that we eventually end up eating, this however, could be positive as the protein we obtain may be improved and more nutritional. With the resistance to pests and herbicides it could lead to the creation of super weeds and super bugs that will become resistant to stronger forms of chemicals and ultimately become resilient.

Golden Rice, which is a basic food needed in rural areas and originated in Asia. This crop was genetically modified to be produced with the gene of a daffodil, Narcissus pseudonarcissus, which produces the phyotene synthase enzyme as well as the gene from Erwinia uredovora bacterium. These genes gave the rice the ability to produce nearly twenty times the beta-carotene than normal rice. The beta-carotene is converted to vitamin A in the liver of humans, therefore increasing a humans intake of vitamin A. Vitamin A is lacking in many underprivileged populations and increasing the intake would be vital as, according to the World Health Organization, it is “ the most important issues in terms of global public health”3 as a deficiency in this vitamin weakens the immune system and could ultimately cause blindness . This is why the colouring is so important. Other types of rice have been genetically modified to combat iron deficiency. Iron deficiency impacts almost “30%”4 of the current world population, the gene implemented into golden rice produces the protein that helps bind iron as well as enhances the absorption of iron.

Corn is another widely genetically modified crop that is eaten in areas that are struggling financially. Corn has been engineered in such a way to resist insects, disease, herbicides and produce larger yields as well as the ability to thrive under a wide range of conditions that are not always favourable. The improvements of corn are seen in that they have the ability to be planted in previously infested areas that would destroy normal harvests. Modified corn carries the gene from soil bacterium which gives it the ability to resist insects as well as carrying a transgene that enables the resistance of herbicides. Non-genetically modified corn is

susceptible to various fungi and bacterial diseases. In this way the gene of non-susceptible plants are inserted into the corn, not only does this combat the disease but reduces the levels of mycotoxins which are potentially carcinogenic in humans.

From my primary research it was interesting to note the large amount of genetically modified corn that is found in our daily products, in our own supermarkets. Cornell University's Dr. Susan McCouch, who is a professor of plant breeding believes, "GMOs [genetically modified organisms] may help to alleviate world hunger and malnutrition." 5

There are various issues and ethical issues surrounding this controversial topic. People are concerned around the unforeseen health risks such as that of causing an allergic reaction or producing toxins that we are ingesting that would not naturally be present in our foods. However, researchers have used the technique of genetic modification,in other fields like genetic diseases, and believe they will be able to overcome inherited disorders of Huntington's disease and cystic fibrosis. Personally, if they are able to find medicalcures through these resources they can be used to feed our population and that majority of populations will benefit. Another risk of genetic modification is that genes that are antibiotic-resistant are transferred, which results in the incorporation of these products into humans. Not only would this effect humans but would impact the ecological balances in the environment which results in the active spread of disease in plants and animals, however, the transfer of the gene is done at a low rate and has not presented a problem as of yet.

Populations have mixed views on the use of engineered plants. Their beliefs range from strong disapproval to acceptance and belief that they are better for their families; these views were also largely dependent on the level of their education. Further issues arise from religious apprehension and the "right to play God". There is belief that nature should not be tampered with, I could originally relate to this, however, after extensive research this has changed my view. Those that are strongly opposed are often uneducated and stubborn in their belief. Studies showed that as the degree of opposition to genetically modified foods decreased, the levels of knowledge around them increased. As well as the concern that the effect on human health is not fully understood and are believe to be unnatural.

Some people are opposed to the use of genetically modified organisms, as this will threaten small-scale farmers as large commercial companies patent genetically modified organisms. By large conglomerates holding power, such as Monsanto, they do not allow small businesses to profit off the production of genetically modified organisms. This also takes the business of crop production on farms away from farmers, unless they are working under large corporations, which is still negative as they pay higher prices for supplies and get less profit then they would have received before. These conglomerates make the seeds for genetically modified crops, these seeds cannot reproduce to give a second season of crops, are expensive to buy and will only grow in the fertilizer that their company produces. Therefore, large corporations are the only ones making profits from the production of the crops and this will negatively influence small-scale farmers in the future, who may go out of business.

On the other hand, genetically modified food products must meet the standards of traditional foods. They have to pass safety standards and have no additional health risks. Even though there may be allergen issues, traditional products pose the same threat in an average supermarket. Genetically modified foods have yet to be the cause of a single illness or death. Industry experts are continually testing genetically modified crops which is done extensively and

repeatedly. We have been eating them for a while now and if nothing has yet occurred we should not have to worry. The use of genetic engineering has increased the amount of food for humans and for animals; this has huge advantages in remedying the food crisis. This allows more crops for humans that have more nutrition or more crops for animals making them stronger, so when we consume their meat it is of better quality and more beneficial. Lastly if the food is going to animals, the rest of the crops become available for human consumption. The only disaster that is being created from the genetic engineering is people's opposition and hesitation. It brings in ethical and religious issues; however, alternative traditional options are still available for them.

The main benefits promoted by genetically modified food are its ability to alleviate world hunger. This is a beneficial way to combat world hunger as the food is closely assessed by focusing on various aspects such as the toxicity of the food, the potential to provoke allergies, the inserted genes stability and any unintended effect that could result from the gene. Not only are they proven to be safe for ingestion but safe for the environment and for the people that are living on Earth. The foods are currently passed by the safety requirements on the international market. Since the prices are reduced, more product yields are made and their life span is increased. It provides good enough reason to provide food for the hungry world and attempt to eradicate hunger.

South Africa has set up various bodies to guide safe eating of genetic modified foods. The South African department of agriculture, farming and fishing has set up a legislation, the Genetically limits potential harm to humans, animals or the environment. This means that the foods that are genetically modified that are available are safe and that if more of these substances are used people are in no risk of health issues. Within this Act, is the body, The Registrar, who are responsible for administrating the act. The Advisory Committee evaluates the applications and is made up of a group of scientists; this gives me enough consolation that these products will not harm humans.

Finally, I believe that the benefits for the majority of the population outweigh the negatives. The use of genetically modified organisms as food crops helps enrich the foods we eat with nutrients and vitamins that will benefit for our health. These benefits will ultimately eradicate poverty and the malnourished population by reducing the price of food whilst giving them the required nutrients in fewer amounts of foods. On the other hand, there are ethical and religious boundaries that cause people to believe that products are not natural and that we do not have the right to "play God". The problem also comes in when there is no scientific evidence to prove they are not a health hazard. However, after the extensive research I can say that no evidence supports a risk to health and that they are more beneficial and are completely safe for consumption. Genetically modified foods are the way of the future and the solution to the food crisis we are currently facing. There is no evidence that this could lead to a disaster, there is no side effect that will have a big enough impact on us, without taking this step I feel would be more traumatic. I was initially apprehensive by this method, nevertheless, through being better educated my opinion has been swayed and I can say that this is the way forward.