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# Genetically Modified Organisms: Progress or Blight?

Martin Lopez

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Martin Lopez

Senior Capstone

Concentration (English)

Research Essay

Humanities and Communication

Spring 2024

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**Table of Contents**

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HCOM 475-03

16 May, 2024

Project Proposal: Research Essay

1. **Name**: Martin Lopez
   **Area of Concentration**: English

2. **Focus**: Should the food industry continue to add GMOs within our food knowing the harmful effects that occur in our body by consuming processed foods? The reason I chose to discuss GMOs is because I believe it is important to bring awareness about the type of ingredients being put into our food. Also I thought it would be interesting to explore the origin and science behind GMOs.

3. **Alignment with Common Theme and HCOM**: Since the theme of our Capstone Class is food, I believed that researching GMOs would be an appropriate topic to discuss since it alters our food and affects how we choose what to eat. In terms of aligning with Humanities and Communication to which my field of study is English, writing this research paper will help refine my researching skills as well as my writing.

4. **Purpose**: The purpose of this research paper is to make a case against the use of GMOs within our food. Hopefully with this paper I can shed some light on how the food industry is not being so transparent on what they put into their food products. Why do they do this knowing how health issues may occur? Why conduct experiments on the food we need to gain our nutrients? I intend to use sources that provide a scientific background around GMOs and any other peer reviewed sources and articles that provide insight into the negative effects of GMOs.

5. **Capstone Title**: Genetically Modified Organisms: Progress or Blight?

6. **Working Summary**: With this project I intend on developing a research paper tackling the controversies of GMOs. In this paper I wish to explore both perspectives of GMOs discussing both the pros and cons of this topic. My stance on the topic of GMOs is that I do not agree with food corporations completely altering our food. With this research I want to emphasize why it is

so to create more organic options for the better of our health. Hopefully with the research sources I provide, it will become a very convincing research paper.

7. **Sources**: So far these are the sources that I believe were interesting and could complement my research paper.

Editing of Crop Plants: Relaxation and Realities." Current Science (00113891), vol. 123, no. 10, Nov. 2022, pp. 1191–92. EBSCOhost, search.ebscohost.com/login.aspx?direct=true&db=aph&AN=160389227&site=ehost-live

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Bawa, A S, and K R Anilakumar. "Genetically modified foods: safety, risks and public concerns-a review." Journal of food science and technology vol. 50,6 (2013): 1035-46. doi:10.1007/s13197-012-0899-1

"How GMO Crops Impact Our World." *FDA*. para. 1-6. https://www.fda.gov/food/agricultural-biotechnology/how-gmo-crops-impact-our-world

As far as other potential sources, perhaps I may acquire more sources from the FDA website and others pertaining to scientific data and health journals discussing GMOs. Using the CSUMB database should also provide some useful sources.

8. **Next Steps**: The next step would revise my project proposal after it has been reviewed. Then I would probably begin brainstorming a thesis and other research questions that may come to mind. Then I can get started drafting my research essay in the coming weeks. Hopely I can craft an essay that is up to the standards of the guidelines.

9. **Timeline**: In laying out a timeline, I plan to spend a week or two going into March gathering any other sources, such as statics, surveys, and other forms of data that could provide aid in building my thesis. Then I will spend two more weeks crafting my thesis and rough draft. Then soon after it is critiqued, I will spend another few weeks leading into April revising that draft by improving my thesis and conclusion and strengthening my essay with more evidence. Then the hope is I will have a fine-tuned research paper that will meet the requirements of the Capstone project by the due date that will be set for the final draft which is dated to May 10th.

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HCOM 475-03

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GMOs, otherwise known as genetically modified organisms, is a term most associated with our food products. Scientists have taken it upon themselves to modify and change our food for supposed benefits. Even some of the food industry's biggest corporations have been distributing genetically modified food within our markets for years. They forced natural food into the back seat and now they expect the public to accept this new era of scientifically engineered food. Most of the public isn't even aware of what exactly they are putting in our food. Various topics will be covered within this report such as the origins, negatives, positives, and more healthy natural solutions to combat alterations to our nutrients. Now it is time to ask ourselves, should the food industry be allowed to continue to add GMOs within our food, knowing the possible harmful effects that may occur in our body by consuming processed foods?

Before discussing how genetically modified food has impacted our society we need to understand the origins of scientific modification to our food. The modification of various foods can be noted as Genome editing. In a journal called "Genome editing of crops plants: relaxations and realities," states that Genome editing is the technique by which the genetic material of an organism is altered by adding, deleting or changing the bases present in the DNA, thereby altering the gene function" (Augustine 1191). The transfer of DNA from one organism to the other has been dated as far back as the 1940s as according to a journal from National Liberty of

Medicine titled “Genetically modified foods: safety, risks and public concerns” states, “Scientists first discovered in 1946 that DNA can be transferred between organisms. It is now known that there are several mechanisms for DNA transfer and that these occur in nature on a large scale, for example, it is a major mechanism for antibiotic resistance in pathogenic bacteria” (Anikular 1). Discovering such a breakthrough in DNA must have been quite a shock, but to then incorporate such a technique into food products could be very questionable. Scientists would then begin the first official experiment with a simple tobacco plant. As stated within the journal, “The first genetically modified (GM) plant was produced in 1983, using an antibiotic-resistant tobacco plant. China was the first country to commercialize a transgenic crop in the early 1990s with the introduction of virus resistant tobacco” (Anikular 1). Crops being designed to resist any disease, it sounds useful to ensure the integrity of our food supply. But one has to wonder about the underlying effects that come with altering a crop’s DNA. Even in our own home within the United States, scientists have wasted no time delving into the genetics of food in order to free society from the hardships of growing crops. For example, the United States alteration to the tomato as stated in the journal titled “CRISPR technology is revolutionizing the improvement of tomato and other fruit crops” reports that “In 1994, the transgenic ‘Flavor Saver tomato’ was approved by the Food and Drug Administration (FDA) for marketing in the USA. The modification allowed the tomato to delay ripening after picking” (Wang 3). This makes you ponder how the FDA of all organizations would approve what probably would have been a very controversial step for mankind by going from fresh and natural food to some experimental produce. There is no food that could possibly be better than the type we have been growing from nature for decades. Unfortunately, to this date many of the foods we consume here in the United States have been genetically modified in some way. According to a report from the U.S.

Department of Agriculture, “By 2020 (the most recent year for which data are available), about 55 percent of the total harvested cropland in the United States was grown with varieties having at least one GM trait. The most prevalent GM traits are herbicide tolerance and insect resistance” (1). It is extremely disturbing to discover scientists have altered over half of our food supply. Major crops such corn, soybean, canola, and sugar beets have been altered. Most of the general public does not have knowledge of what they buy from the grocery store. A call to change what food our government has been providing is in order. With so many of our foods being affected there’s no telling what kind of negative impacts they may have on our bodies.

With such drastic changes, many wonder what kind of impact consuming these modified foods everyday has. After some thorough research, there seems to be a lack of data pertaining to the effects of genetically modified foods on human beings. No human trials have been conducted, however, according to an article called “Genetically modified foods: Helpful or harmful.” It reports that scientists have conducted a number of trials with animals by having them consume GMO products. Results of these trials were very concerning to say the least. According to the clinical trials the animals developed a series of health risks such as, infertility, immune problems, accelerated aging, faulty insulin regulations, and alterations to organs and gastrointestinal systems (Piedmont Healthcare). If genetically modified food can have this kind of effect upon animals, one can only imagine the potential health risks that human beings could contract by eating GMOs. These side effects should be studied more closely and not be neglected. With the harmful impact to health caused by GMOs, there have also been some very concerning impacts on the environment.

With the amount of genetic modification being performed, the number of crops affected may be significant. Nearly most of the crops have been exposed to modification. For instance, in

the article titled, “The Environmental Impact of Genetically Modified Crops,” stated that “In 2018, 48% of the global plantings of these four crops utilized biotechnology. The main traits conferred to these crops through this technology are insect resistance (GM IR) and herbicide tolerance (GM HT). These traits help produce high crop yields and lend themselves well to the monocropping farm techniques used for these commercial crops” (Chamberlin 1). Such precautionary measures are being utilized just to protect the crops from any pests. Although these intentions may seem pure on the surface. There is a concern about just how these chemicals could affect other species. For example, “in 1999 a published study raised concerns that a Bacillus Thuringiensis (Bt) insect resistant corn crop was negatively impacting Monarch butterfly larvae. While the results of this study were concerning, the study itself took place in a laboratory” (Chamberlin 11). Scientists should be very concerned if their experiments are interfering with the natural order of insects. Searching deeper, despite such alarming news, there seems to be such agency to study this issue further as the article states, “Our study was conducted in the lab and, while it raises an important issue, it would be inappropriate to draw any conclusions about the risk to Monarch populations in the field solely on these initial results” (Chamberlin 11). Then, “In 2001, a follow up study published in Proceedings of the National Academy of Sciences (PNAS) concluded that the impact of Bt corn on Monarch butterfly populations is negligible " (Chamberlin 11). Think that such an urgent event would nearly jeopardize the Monarch Butterfly, yet these scientists seem to brush the situation off as if it was just some insignificant occurrence. We must open our mind to the possibility that these genetically modified crops could be affecting more species or even a structure as vital as biodiversity.

Biodiversity is the most crucial foundation for all living organisms. In an article titled "How Do GMOs Affect Biodiversity?" writer Melissa Wadelle states that "The word "biodiversity" includes all of Earth's living organisms — plants and animals, soil microorganisms, bacteria, and fungi — plus all the genetic variation within those species *and* the ecosystems that are home and habitat to all of this life" (2). Biodiversity is an important foundation of life. Any in-balance could mean disaster. As Wadelle says, "These ecosystems can be incomprehensibly complex. The presence — or absence — of a single organism can ripple outwards to affect the whole" (2). The delicate nature of our ecosystem is under grave threat of genetically modified crops. The continuous use of GMOs has forced the soil to degrade. As reported in the article, "The practice of "monocropping" — cultivating a single crop, year after year, on the same land — might seem efficient, but it ultimately decreases both biodiversity and soil health" (5). Even the integrity of our soil is being compromised. Without healthy soil we could be in a major crisis of not being able to grow the food that is essential for our society to thrive. GMOs were created in an attempt to improve our agriculture and yet, ironically, not that they are slowly disrupting the strength of our agriculture. One couldn't imagine a world without agriculture. In the article, "A World Without Agriculture," The structural transformation in agriculture is a powerful historical pathway experienced by all successful developing economies. It encompasses highly important and diverse approaches to coping with the political pressures generated along that pathway and policy mechanisms available to keep the poor from falling off the pathway altogether" (1). Agriculture is an integral building block in our society, our world would be so drastically different if no Agriculture were to exist in our society. There is no scenario in which humanity can thrive without the wonder of growing crops. As the article observes, "Historically, the answer to the question about the role of agriculture in economic

development is clear. No country has been able to sustain a rapid transition out of poverty without raising productivity in its agricultural sector" (Timmer 6). There are so many aspects in which GMOs negatively impact the future of food. But the good GMOS that have provided for the evolution of maintaining a steady supply of food cannot not be ignored.

With the introduction of genetically modified crops, there is no denying the good this breakthrough in science has provided. When growing crops we have to be concerned with various factors such as sustainability through the harsh weather and environment. There is also the risk of pests, such as insects, that could damage the crops in a matter of minutes. Also, the risky use of pesticides is worth mentioning. Ingesting crops exposed to it could lead to a number of health issues. As stated in the article, "Potential Health Effects of Pesticides" it states that "Suspected chronic effects from exposure to certain pesticides include birth defects, toxicity to a fetus, production of benign or malignant tumors, genetic changes, blood disorders, nerve disorders, endocrine disruption, and reproduction effects" (Lorenz 6). Pesticides have caused too many ailments to unsuspecting people who were just trying to feed their families, only to end up sick. The destructive potential of pesky insects should not be underestimated. In the article, "Insects and their injury to plants" makes note that, "Some insects cause damage by cutting the plants for egg-laying. Conspicuous among these are cicadas, which during years of peak emergence can cause considerable damage to small branches of trees. Tree crickets also lay eggs in stems, and while doing so, may transmit disease agents" (10). Insects pose such a detrimental threat to our crops. It very much makes us appreciate the safeguards that have been enacted within to lower the use of chemicals and combat infectious bugs.

With the implementation of genetically modified crops the struggle to maintain the consistency of strong fruits and vegetables have become that much simpler. As reported in the

article titled, “The human health benefits from GM” “Grown by millions of farmers, many in developing countries, the technology is providing significant economic and environmental benefits, such as reductions in chemical use of 37%, increased yields of 22% and improved farm profits of 68%” (Smyth 1). With the creation of genetically modified crops, farming for food has improved to become such a marvel. Since the GMOS have assisted in the growth of the crop industrial complex, there has been a massive decrease in the use of chemical pesticides in many countries. As stated by Smyth, “In South Africa, farmers reduced pesticide applications from 11.2 per year to 3.8, with reported cases of pesticide poisoning declining from over 50 per year to <10 over the first 4 years of Bt cotton adoption” (4). Genetically modified crops have yielded some very positive results for the longevity of non-chemical growth. Even places such as India have garnered salvation from the wonders of genetically modified crops. As reports state, “Assessing the health impacts in India reveals a reduction in cases of pesticide poisoning of 2.4–9 million cases per year. Cumulatively, since 2003, when Bt cotton was first commercialized in India, a minimum of 38 million fewer instances of pesticide poisoning have occurred, with an upper potential of 144 million” (Smyth 4). Based on this data, genetically modified allowed for the most significant decrease applying any form of insecticides or chemicals by such a grand margin. With less fruit being exposed to chemicals comes the great relief of not having to fear the harmful health defects that such chemical compounds may cause. There is no such reason to taint nutrients that are important for our survival. Before genetic modification, a major country such as China had also suffered from terrible illnesses due to the chemical spraying. For example, “A medical assessment of 246 Chinese farmers, involving 35 health indicators, found that fungicides associated with the production of non-Bt cotton had linkages to damaged liver function, while the insecticides used in non-Bt cotton production may be associated with severe

nerve damage" (Smyth 5). Liver and nerve damage, these horrible side effects are plaguing the farmers due to their constant exposure while working out in the field preparing food for the entire nation. Also due to such disparities, the mental state of the farmers had been reported declining for quite some time due to the state of their physical health. Though the use of modified crops has changed the lives of the Chinese farmers forever. As stated in the article, "Farmer suicides were trending upward from 15 000 per year, peaking in 2004, the year after Bt cotton was first commercialized in India. By 200 7, the actual suicide rate was 25% below the extrapolated suicide rate" (Smyth 7). When discussing agriculture, it's hard to imagine the physical and mental toll it has against the people responsible for providing the majority of our food. Farmers are the backbone of our society. These genetically modified crops are providing farmers a means of relief for them and guarantees that they will not be at risk of contracting disease or become overwhelmed by stress. Stress could be detrimental to one's well-being, as the document details, "Stress in agriculture is like every other sector of the business economy, although in the agriculture sector, the stresses may be more related to financial debt servicing and the potentials of crop failure. Both factors can contribute to the stress burden of farmers" (Smyth 9). It is just miraculous how a new breed of plants would create such an impact towards the human mind. However, suicide rates coupled with nerve and organ failure weren't the only concerns when it came to the prolonged use of pesticides.

Cancer remains to be one of the most dangerous risks to one's health when it comes to using chemicals as well as the accumulated growth of insect damage towards every crop. Some of those dangerous toxins in particular came to be known as mycotoxins and fumonisins, as reported in the document, "Mycotoxins are both toxic and carcinogenic to humans and animals and are considerably more concerning in developing economy food systems where access to

food safety toxicity tests is less prevalent. Fumonisins are correlated to being the cause of higher rates of neural tube defects in high maize-based diets" (Smyth 8). Miraculously enough, once the commercial use of genetically modified crops started to take off, the trace of any such chemicals started to deplete by a great amount. As stated, "A study of 21 years of maize production quantified that Bt maize contained lower concentrations of mycotoxins (29%), fumonisins (31%) and thricotecens (37%)" (Smyth 8). It is thanks to the genetic breakthrough that one of major food sources and the men and women responsible for producing them have their health safeguard by what scientists may call a revolutionary marvel. With such safeguards, these crops have also been reportedly bred to give us all the nutrients we as human beings require for our survival.

One of the main characteristics of the average human being is sporting an omnivore type diet. Each day we do our very best to eat the best possible produce in order to keep our body in the best shape possible. With genetic modification comes the dominant control of transferring any vitamin or mineral at the disposal of the scientist who controls such procedures that has assisted in the fight against poverty and hunger. "While increased yields have contributed to higher household incomes, which reduce poverty, the increased yields have also enhanced household food security. Biofortified GM crops have been adopted, increasing micronutrient availability" (Smyth, 10). Poverty and hunger are some of the most consistent leading issues that mankind has faced for decades. With so many people inhabiting this planet the demand for food comes at such a price. Under normal circumstances, normally grown crops would not possibly be able to sustain the population. Yet, these genetically modified crops have opened so many possibilities to provide so many who are in need of the proper sustenance. As reported in the document, "Improving the nutritional content of daily food consumption certainly has day-to-day

effects, but of significant importance are the long-term effects that extend for decades over the course of an individual's lifetime" (Smyth 10). The goal for most human beings is to live a long and healthy life. Although it may be difficult for some to achieve a healthy lifestyle, GMOs have made it possible for everyone to gain access nutrient rich fruits and vegetables without having to worry about having enough nutrients, as reported, "In many instances, improving macronutrients (proteins, carbohydrates, lipids, fiber) and micronutrients (vitamins, minerals, functional metabolites) has significant childhood health improvements, such as reducing blindness due to the lack of vitamin availability" (Smyth, 11). The purpose of these genetically modified produce is to have more availability and nutrients. However, we cannot ignore the potential danger that GMOs may inflict onto the public. Which is why the public should strive to find healthier and safer choices of food.

Having combed through various forms of information, there is no denying the potential that can arise from future research through genetics. However, there are so many more options when it comes to food. Fresher is better after all. Producing food for the whole world to consume, doesn't seem to be the target for genetically modified producer, as explained in the article "GMOs Don't Feel the World," "The vast majority of GMO crop production does not go towards direct food consumption; rather, it is used for the production of animal feed and ethanol. These are crops engineered to withstand, work in partnership with, and self-generate pesticides" (2). You would think a goal for a momentous food industry would be to feed billions of people and yet these corporations are more concerned with bolstering their own supplies. With all their success, it seems that their crop resistant nature is too effective. As reported, "Unfortunately, growing weed and pest resistance is already decreasing their effectiveness, requiring much more dangerous pesticides, and making useless one of the most used organic pesticides, Bt. These

minimal increases in yield have come with major externalities, including but not limited to water pollution, pollinator loss, and soil degradation, that put future food security at risk" (3). Fortunately, there are methods we can implement so that we don't end up so reliant on multimillionaire fronts. One alternative that may prove useful to tackling the demand and recouping what resources we have taken from the Earth itself. This method would be known as Agroecology, a science which can be defined as "a science is the application of ecological science to the study, design, and management of sustainable agroecosystems" (6). Based on this definition, the study of Agroecology helps maintain a more balanced form of food production. More natural and more sustainable as described in the article, "As a set of agricultural practices, agroecology seeks ways to enhance agricultural systems by mimicking natural processes, thus creating beneficial biological interactions and synergies among the components of the agroecosystem" (6). Science may have helped us progress in so many areas of society, but we cannot let it corrupt the way we produce and consume our food. Agroecology is a new foundation on how many can receive their food. We have to protect and strengthen our resources, not strain them. Agroecology is already revolutionary with smaller businesses aiming to provide the public with a more natural variety of food. As noted, "Agroecology is also a much better system of management for small holders and provides a more balanced diet with more nutrient dense crops. Smallholders already produce 70 percent of the world's food on only 25 percent of the land" (7). These small businesses have made this much of an impact for the world, now one can only imagine the possibilities if major corporations adopted this technique as well. Though with many companies prioritizing profits over quality, that reality may be nothing more but a distant dream. There are still other realms of possibilities for people to find more fresh alternatives from the genetically modified trend.

Another way of providing a more natural alternative to GMOs would be to start your own garden. Instead of stressing over what produce to purchase you have the safety and confidence in knowing that growing your own food alleviates the concern of genetic modifiers and cancer inducing pesticides. Shockingly, half of Americans have already started the investment of growing their own food as the covid pandemic, believe it or not, encouraged so many to try their hand at gardening. In an article titled, "Gardening Statistics in 2024 (incl. Covid & Millennials)" It states, "2021 has been a great year for the gardening industry as the research documented 18.3 million new gardeners in the United States" (Mayers 1). That many new gardeners in 2021 alone is very much inspiring. Given the opportunity, people can be very self-sufficient in growing their own food. The United States wasn't the only country affected by this resurgence. As documented in the article, "U.S. and Canadian garden centers saw a whopping 65% increase in millennial customer demographics and a 44% increase in generation Z demographics" (Mayers 1). Since ancient times, people have been growing food, but slowly as time passed this skill was used less. The mere notion that it took a global pandemic to reinvigorate the public's ability to self-sustain, is an incredible feat on its own. Not only can gardening give a natural source of food, but it has also been quite impactful towards the public's health and relationships towards their families. As stated, "49% of participants engaged in gardening because it's good for mental health and 35% found that it's a good activity for the whole family to engage in" (Mayers 2). It is not only combating the need for natural food, but combating stress that every person has to deal with on a daily basis. Gardening is also quite the money saver, as reported in the article, "The average garden yields $600 of produce in a year, which is roughly $1 per sq. ft. When subtracting the $70 spent per household, the average household returns about $530 each year from its garden" (Mayers 8). Of course, we have to remember that growing and maintaining a garden is time

consuming, but the returns are quite rewarding. Not everyone may have the luxury or the time to grow their own food so the next best possible alternatives to genetically modified products would have to come from farmers' markets.

Most may be familiar with the concept of farmers' markets. They are another source for acquiring fresh and organic produce. The "Farmers Market Coalition" defines a farmers' market as, "A farmers' market is a public and recurring assembly of farmers or their representatives selling the food that they produce directly to consumers. Farmers markets facilitate personal connections and bonds of mutual benefits between farmers, shoppers, and communities" (1). People need to see the individuals responsible for producing the food they eat, but most of them hide behind a lab or an office chair in a tall building. At the farmers' market we know who is representing the food displayed once you set foot on this wonder. If there are any concerns towards the legitimacy of the farmers market, it's safe to say that this particular business follows a strict set of guidelines as indicated, "Each farmers market defines the term "local" according to the agriculture of its region and regularly communicates that definition to the public. Farmers markets also implement guidelines and operating rules that ensure the farmers market consists principally of farms selling directly to the public products that the farms have produced" (1). Strict and well-managed guidelines, not a single inconsistency or red flag. What kind of fresh produce might one find at the farmers' market one might wonder? It all depends on the area or region that the markets are centered in. For example, "Depending on the time of the year, you might find avocados, olives, steak or artichokes in Texas or California, and be more likely to find paw paws, peanuts, pork, and peonies in Virginia" (2). There is so much variety when it comes to these markets, of course there are other markets that don't just produce but other assortments as well, for instance, "Some markets concentrate on produce, while others carry everything from fruits and vegetables to baked goods, meat, eggs, flowers, and dairy products. Some may carry locally made crafts or

prepared foods as a complement to the agricultural products they sell" (3). All of this variety, and all from naturally grown soil. Another concern could possibly be the readily availability of such produce. Surprisingly enough these farmers' markets are readily available in the winter as well. As reported, "In 2010, roughly 15% of all farmers markets were open in the winter months. Nevertheless, year-round farmers market thrives in many states. Many markets are expanding their seasons or transitioning to year-round operation by offering their shoppers items including meat, eggs, dairy, bread, and other products that are available fresh throughout the year" (5). Having fresh quality products is possible through these markets, without the need of any bio engineering or modification. Farmers have also been resourceful when it comes to tackling the ruggedness of the winter season. As reported by the site, "Even in colder climates, farmers are implementing a variety of season-extending techniques that can protect crops from frosts and allow them to be picked and sold fresh for more weeks of the year" (5). The resourcefulness of the farmers is commendable, as they wish to provide for those who are in need of food. That's more effort local businesses are willing to put in compared to the giant corporations who produce fast amounts of food and yet cannot provide for everyone. The people running the markets are of course the farmers, as described, "Many markets operate independently, or with the help of city or nonprofit partners, sometimes transitioning to a stand-alone nonprofit as they grow. No matter how farmers markets organize, there is always a market manager who enforces the market bylaws and oversees the daily business of the market" (10). No profits are going to the corporations who seek to tamper with our food. Instead, it can be put to better use and supporting the people who tirelessly grow and care for food that we need to thrive every day. The quality of the care they put into their food is undeniable. As stated by the "Farmers Market Coalition," "Moreover, when farmers can select plants and animal breeds for superior flavor and quality without having to worry about shelf life or long-distance shipping, quality and taste improves" (11). Fresh produce ready on

standby for public consumption not bred to sit on a shelf for a long time. People desire an organic flare not an artificial lab experiment. Moreover, while most do not agree with the genetic manipulation some have taken it upon themselves to not alter to improve crops in a whole new way.

Plant breeders want to introduce a whole new way to produce a variety of fresh produce. In this case it would include a fondness for chili pepper plants. A person named Micheal Mazourek tasked himself with a mission to create the perfect chili pepper without the slightest need for altering its genetic code. As described in the article, "Creating Tastier and Healthier Fruits and Veggies with a Modern Alternative to GMOs," It is reported that, "Mazourek raised the seeds he got in the mail into adult plants and mated them with ordinary habaneros. Inside greenhouses he carefully transferred pollen between flowers on the two kinds of plants with tweezers, ensuring that the resulting offspring and, eventually, the 600 grandchildren would have a mix of their parents' DNA" (Jabr 4). Instead of tainting or mixing the DNA of these habaneros' chili peppers, Mazourek combined both using pollen alone to create a whole new cross species all to uncover the secrets of chili peppers. Mazourek forged a new path in the agricultural industry, a path that doesn't need scientists poking and prodding around creating abominations in a lab. The article describes it perfectly, "Mazourek belongs to a new generation of plant breeders who combine traditional farming with rapid genetic analysis to create more flavorful, colorful, shapely and nutritious fruits and vegetables" (Jabr 7). Breeders like Mazourek will set an example for others to engage in a more safe and humane way of creating rich and vigorous crops.

GMOs, a scientific marvel, but the risks outweigh the benefits to mankind. Genetic modification may have made agriculture easier at the cost of our own health. There are other ways in which we can sustain ourselves with fresher soil growth, cared for and nurtured by

farmers, who should be responsible for sources of food. Go to the market, grow your own food or breed a crop with nutrients and sustainability. After all, a fresh crop means a better and healthier tomorrow.

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