

Agricultural biotechnology in kenya

Technology



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Agricultural Biotechnology in Kenya Final Draft Introduction Agricultural biotechnology is one scientific invention that continues to cause debates within the world. Although one country may see great benefits for the technology, another may reject it due to cultural and ethical beliefs. Within the following paper, it will be a goal to research the background of biotechnology and to determine if this invention can solve many problems within the continent of Africa and specifically the country of Kenya.

It is no secret that Kenya has been under developed as well as under privileged for quite some time. In order for Kenya to develop and reach its potential of a business partner with other countries, it must find a technological advancement to not only provide for its own population but also provide substance to other areas as well. The use of agricultural biotechnology holds this promise for Kenya. We will take a look at not only the culture of Kenya but also explore the positive and negative impacts that biotechnology may have on this third world country. Kenya's Culture

Kenya is a republic government that achieved independence on December 12, 1963 and within the next year joined the Commonwealth of Nations. Jomo Kenyatta, a member of the large Kikuyu ethnic group and head of the Kenya African National Union (KANU), became Kenya's first President. The minority party, Kenya African Democratic Union (KADU), representing a coalition of small ethnic groups, dissolved itself voluntarily in 1964 and joined KANU (US Department of State, 2011). As of August 2010, Kenya made a referendum of its constitution and now has an executive, legislative and judicial system.

The National Assembly has a number of members that are elected for 5 year terms. The Executive Branch consists of a president (chief of state, commander in chief of armed forces), prime minister (head of government), and two deputy prime ministers. The Legislative Branch consists of a unicameral National Assembly (parliament). Lastly, the Judicial Branch is considered the Supreme Court, Court of Appeal, High Court, various lower and special courts, including Kadhi (Sharia) courts. There are administrative subdivisions of 140 districts which are joined to form 7 rural provinces.

Under the new constitution, which is in the process of being implemented, the primary administrative subdivisions will be 47 counties, each with an elected governor. There are now over 40 registered political parties. The two coalitions, the Party of National Unity (PNU) and the Orange Democratic Movement (ODM), dominate the political party scene. PNU membership is filled by parties representing Kikuyu and closely related ethnic groups; ODM membership ranks are filled by parties representing nearly everybody else.

PNU and ODM agreed in February 2008 to form a coalition government in a power-sharing arrangement that ended the political crisis erupting after disputed national elections in December 2007. The economy of Kenya is what one would expect of a third world country but the country is trying to make great strides in overcoming this description. The main natural resources that Kenya has are its wildlife as well as land. Kenya relies on its agricultural growth to build its economy through industrial and trading industries and biotechnology. Biotechnology can assist greatly with the economic growth of the country.

As according to the Atlas Method of 2008, the gross national income per capita in Kenya was \$780. Currently Kenya has a GDP of \$32 billion and an annual growth rate of 5. 4% as of 2010. Kenya relies on its agriculture to promote its products of tea, coffee, sugarcane, horticultural products, corn, wheat, rice, sisal, pineapples, pyrethrum, dairy products as well as its meat and meat products such as hides and skins. Its main industry types include petroleum products, grain and sugar milling, cement, beer, soft drinks, textiles, vehicle assembly, paper and light manufacturing.

The structure of its economy is that of services (59. 5%), industry and commerce (16. 7%) and agriculture (23. 8%). The work force consists of formal sector wage earners of 1. 95 million with which it is divided into public sector (30%) and private sector (70%). Informal sector workers are at an approximate 6. 4 million (Bureau of African Affairs, 2011). At this time, Kenya is at an approximate \$4. 96 billion business level in exports to include much of its agricultural and industry products. The major export markets that Kenya does business with are Uganda, United Kingdom, Tanzania, Netherlands, United States and

Pakistan. Kenya currently imports an approximate \$11. 6 billion of products in machinery, vehicles, crude petroleum, iron and steel, resins and plastic materials. Although many may not know it, Kenya is home to at least 16 universities consisting of public and private institutions. Education has become an instrumental tool to allow Kenyans to achieve success both personally and collectively as a country. It has a developed education system, which includes eight years of primary school, four years of secondary school and four years of university education.

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The school system is undergoing slow but sure development through the effort of the government. There are a number of schools which incorporate international systems of education such as American, British, French and German based learning. Kenya has seven national universities to include national polytechnics, seventeen institutes of technology and twelve technical training institutes. The schools in Kenya were fraught with problems that include students not being able to afford the fees as well as teachers being under paid. The Kenyan government made a promise to provide free primary education to its citizens.

However, this promise did not materialize until 2003 due to the low economy and increasing population of Kenya. The “ Harambee”, meaning pulling together in Swahili, system plays a significant role in the Kenyan primary education program. They are responsible for the development and upkeep of 75% of the schools in Kenya and look after their infrastructure, school books, as well as the environment and teaching standards. The Kenya National Examination Council was established under the Kenya National Examination Council Act of 1980.

Due to a break-up of the East African community, the KNEC Act was setup to take over the control of these examinations and to ensure the maintenance of their standards. Kenya is a country that has a wide range of religion interests to include Christianity, Muslim, Hindu and other traditional African faith and beliefs from their ancestors. Kenyans belief in Harambee leads to a strong personal life and as a result leads to close knit communities. About 33% of Kenyans are Roman Catholics, another 45% follow Protestantism, 10% Islam, and Indigenous Religions are at 10% (Africa Travel, 2011).

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A large amount of Hindus in Kenya belong to the Indian community. Before Kenya was introduced to Christianity, they followed traditional, indigenous beliefs. There are two types of Christianity in Kenya; the Roman Catholics and the Protestant faiths. Christianity was founded in Israel and Palestine 2000 years ago at the beginning of the Common Era. In Kenya, Christianity is based on the life and teachings of Christ. Traditional religion involves an eternal belief in the creator, God that works in all ways and can sometimes be given a different name depending on how He works.

Based on the terms and conditions, Kenyans can determine if God is angry or not. Such examples are that if God refused to bring rain, he was angry and if God brought rain and food, he was happy. Kenyans have a strong belief in God and that He remains hidden from our view in the sky. They believe that He is the reason for the grass, plants, animals, mountains, and rainbows as well as the reason for droughts, famine, disease, and death. Their Christian belief is that Jesus is the Almighty and God's son. Another major religion in Kenya is Islam, which includes Sunni and Shiite Muslims.

These believers are found mostly in Mombasa and the coastal regions. The difference between Sunni and Shiite Muslims are their beliefs. For example, Sunni believes that rightful leaders are those chosen by consensus while Shiites believe leaders must fall directly from Muhammad's family background. The Shiites believe Muhammad's cousin and son-in-law, Ali, was the only designated religious leader. The Sunni maintain the first three caliphs after Muhammad were also legitimate authorities. Overall, each of Kenya's religions has a belief of a single God, and that each religion was directly created by God.

Kenya is a fairly low tech nation that is primarily built in the agricultural industry. However, leaders in Kenya would like to change this image and prove to the world that they are becoming a more high tech nation. Through the past few years, Kenya has made great strides in developing biotechnology advances that could increase the country's level into that of a high tech country. The Government of Kenya (GOK) is focusing their attention in a few different areas to improve their global position in the biotechnology sector.

Many different crops have been modified in labs and universities to be either more disease resistant or insect resistant. One of these items included maize which was specifically designed to thrive in the harsh African soil. By developing transgenic nitrogen additives for the local soil, the soil should produce bigger ears and also allow for larger harvests. Other crops included insect resistant pigeon peas, sweet potatoes, corn and cotton. Unfortunately, many of the farmers of Kenya have not accepted the newly engineered products and are still doing things the “ old fashioned” way.

In order to try and convince the farmers and consumers to use the genetically engineered products, Kenya enacted the National Biotechnology Awareness Creation Strategy (BioAware-Kenya). According to an article written by Mary Onsongo, it is still an open question of how the vast majority of small-scale Kenyan farmers will react to the opportunity to buy and plant biotechnology enhanced seeds. From present-day experience, it is clear that Kenyan farmers have not fully exploited all of the currently available production-enhancing technologies.

Some of the simplest and most cost-effective strategies, including soil testing to determine the correct volumes of commercial fertilizer applications necessary to maximize crop yields, are not employed by the vast majority of Kenyan small-scale farmers. Without the support of local farmers, the biotechnologically advanced products will never be able to be utilized to their fullest potential. With droughts and other resource destroying events taking place all around the world, this puts Kenya at a distinct disadvantage when it comes to advancing in the global marketplace.

History of Biotechnology Development Biotechnology dates back as far as 500BC when the Chinese used moldy curds as antibiotics to treat boils. In 250BC, the Greeks practiced crop rotation to increase soil fertility. These practices led to the scientific development of transferring sections of DNA sequences from one organism to another. DNA technology has become the latest trend in science and plays a major role in the development and implementation of biotechnology. The term biotechnology was coined in 1919 by a Hungarian engineer by the name of Karl Ereky.

Biotechnology is the branch of technology that uses living organisms or biological systems to modify humans and their atmosphere. The technology uses living cells, and materials produced by cells, to create breakthroughs for human needs such as diagnostic, pharmaceutical and environmental advantages. Biotechnology allows us to use organisms and DNA for the betterment of human life, from our food to our general health.

Advancements in biotechnology have been occurring for some time. In the past, humans have found microorganisms to be the catalysts in the processes of turning milk into cheese and fermenting fruit juice into wine.

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Biotechnology has created antibiotics for the sick as well as made it possible to feed a growing population and prepare and preserve certain foods.

Although biotechnology was not fully known about until June 16, 1980 (when the US Supreme Court came to a decision that genetically modified microorganism can be patented), the technology has greatly advanced. It should be noted though that the technology still has a way to go according to the terms of legislations and the laws concerning biotechnology. However, the future of biotechnology will continue to progress as momentous breakthroughs occur.

The United States has been using biotechnology for quite some time. According to the USDA's National Agricultural Statistics Service (NASS), biotechnology plantings as a percentage of total crop plantings in the United States in 2004 were about 46 percent for corn, 76 percent for cotton, and 85 percent for soybeans (USDA, 2011). These numbers have likely increased since then and will continue to increase as the bioengineered products become more of a requirement in order to keep up with the current market. Farmers within the US, for the most part, have accepted biotechnology and its advantages.

In 1986, it was realized that the need to regulate genetic modifying of plants had become a requirement. According to the USDA website, biotechnology is defined as being a range of tools, including traditional breeding techniques that alter living organisms or parts of organisms, to make or modify products, improve plants or animals; or develop microorganisms for specific agricultural uses. Modern biotechnology today includes the tools of genetic

engineering. Farmers have been doing this throughout history in the form of crop rotation, plant splicing, and selective breeding.

The modern version of biotechnology is what prompted the regulation by the government. The regulatory committees that are most involved with the implementation and distribution of bioengineered products are the Food and Drug Administration (FDA), The United States Department of Agriculture (USDA) and The Environmental Protection Agency (EPA). Each of these agencies work together to ensure that any product that has been genetically modified is safe for both distribution and consumption by people as well as livestock. More and more bioengineered crops are being grown every year.

The benefit to the farmer is that the crops will be more disease and insect resistant and produce a greater harvest. The plants are less susceptible to weed growth while they are in the fields and they have better nutritional value as well. Kenya has struggled for political and social freedom as well as the potential to create and store food. Kenya is a very poor country surrounded by little or no technology. Luckily, throughout the years biotechnology has advanced enough to help Kenya in a time of need and the technology will be a great success for Kenya's culture.

The technology of today has made it possible to research and create a way to end starvation in Kenya. The Kenyan government has enacted a policy in September 2006 to guide research and regulate the development of this modern biotechnology. Its intended plan is to put an end to Kenya's plight of hunger and starvation. The policy will help overcome difficult times as its research continues to be studied and developed in the areas of plant,

animal, and microbial methods of growth. The purpose of Kenya's biotechnology is to improve food crop as well as to create a fortified industrial and diagnostic tool against priority livestock diseases.

Impact of Agricultural Biotechnology The implementation of agricultural biotechnology in Kenya, and other countries in Africa, will have far reaching effects that will be both positive and negative in nature. Some of the main areas that will be touched by this technology include government, the economy, the educational system, and religion. While some areas may experience a more profound impact from agricultural biotechnology, all will no doubt see some type of change. Positive impacts on the preceding areas will be discussed first with negative impacts being addressed later in the paper.

The implementation of biotechnology will require some form of governance and can therefore not only create new jobs but can have regional benefits as well. To begin, we will explore some of the positive impacts that the government of Kenya will experience. Due to the complexity of agricultural biotechnology, there will have to be some type of regulatory governance. Kenya would create new divisions in the government as well as subsequent jobs. Some examples of new branches of government needed for this technology include environmental, agricultural, health, industry, planning, finance, trade, and foreign affairs (Juma, 2006).

Along with new branches of government, agricultural biotechnology will also have positive regional effects on the government. For example, if Kenya is able to show its neighboring countries how valuable biotech is then it will

spur the growth of this technology in other countries and therefore create a sense of unity among neighboring countries throughout Africa. This will benefit the government because it will be able to share and utilize the strengths of neighboring governments to accomplish its goals regarding this industry as well as others.

Another key area of government that is positively affected is in relation to foreign affairs. Since this type of technology has been utilized for years by governments in the west, it will open a new door for Kenya to communicate and trade with countries that have this technology and are willing to share its benefits through various corporations and government entities. Overall, there are numerous positive effects on the government that will be felt once agricultural biotechnology is implemented within Kenya.

For instance, with the proper governing of biotechnology it is possible for different countries within a region to unite over a common goal and spread the idea of biotechnology. Likewise, countries that gain the technology to implement any type of biotechnology typically are more successful in creating some type of regulatory committee. The next area to be addressed is the positive economic impacts that agricultural biotechnology will bring to Kenya. Agricultural biotechnology will have multiple positive effects on Kenya's economy as well as the global economy.

The largest change that will be brought about by this technology is the reduction of imported food and therefore Kenya's dependence on foreign imports which would then help to balance the trade deficit. The use of agricultural biotech will increase the national production of food and enable

Kenya's government and/or market to disperse the food to areas that are unable to produce crops. The growth of agricultural biotechnology will also spur an increase in farming which will result in the creation of additional jobs to work the land.

This will have a domino effect on the economy as more citizens will have disposable income to spend on goods and services in other industries. One of the core principals of any economy is the ability of its population to spend disposable income on local goods and services, which will create supply and demand. Another benefit for the economy is the possibility of a new export from the increase in food production. With the increased production of food within the country, there is a chance that the food could eventually become an export to neighboring countries.

The creation of a new export for Kenya will not only have a positive effect on its economy, but can benefit the entire world in both an economic and social sense. An advanced presence in the global economy will not only benefit Kenya but the rest of the world as well as it will open up a new market (Juma, 2006). The education system of Kenya will also be touched by the rise of agricultural biotech in a positive way. The state of many universities in Africa, including Kenya, is not considered one that is ideal for the growth of a nation or its citizens.

To begin, the growth of biotech in Kenya will help bridge the gap between a modern education system, which it is lacking, and the present system in place. Once a new technology is brought into Kenya there will be a need for young engineers and scientists that only Kenya can provide with its own

citizens. This will spur the growth of a modern educational system within Kenya to prep its citizens for occupations in the biotech field. The implementation of science and technology programs within Kenya's universities will also open the door to cooperation from foreign universities that already have such programs in place.

This should encourage the growth of science and technology programs among countries. According to Juma, the work by the program BIO-EARN has helped build the capacity of biotechnology in not only Kenya but Ethiopia, Tanzania, and Uganda as well. These changes are only the beginning of what could be possible for the future of Kenya's education system. Given Kenya's firm faith based population, religion will be another area that will feel effects from the advancement of agricultural biotechnology. Two of the largest religious groups in Kenya are Hindu and Islam.

One of the common themes that these two groups have in common in reference to food is both groups use grain as a large part of their diet. Agricultural biotechnology can obviously provide for this fact since grain production will rise and create a greater supply of food for the population. Christians will also benefit from the increased supply of grains since the price will decrease and there will be more food available for purchase. In addition, livestock will also be able to be fed cheaper with grain so it could decrease the price of meat for Christians and Islam as well.

While there are numerous positive effects from agricultural biotechnology, it is not without its downside. Government will be one area where some of the negative effects from biotech will be seen. To begin, one negative impact is

that new technology brings the need for new regulation. This could then actually make a government over regulate an industry, hindering the growth of the industry that is outputting biotechnological products. A second area that has the potential of hurting the government of Kenya is the fact that biotech has an enormous initial amount of aid that must be invested into a technology such as this.

If not managed properly, this could have the potential of creating a lack of funds for other government programs and therefore either bankrupt the government or force the closure of other state sponsored programs. Another area that needs to be monitored is in relation to other countries within Africa and their view of biotechnology. If a neighboring country is against the use of biotechnology then it has the potential to divide neighboring governments and its citizens against one another along with their respective economies.

With new frontiers and developments comes new responsibility. This alone is one of the negative impacts that biotechnology has brought to Kenya, along with the rest of Africa. Due to the genetic manipulation that is done to medicine and food, government is now responsible for setting new laws, regulations, and policies to help maintain an organized process and prevent such things as exploitation from occurring. Because of this being relatively new to the Kenyan government, they are getting input from more developed countries and/or continents such as Europe and the United States.

Unfortunately this input is giving them mixed signals and making it difficult for them to make the necessary decisions to bring biotechnology to their country. Some of the negative impact comes from worrying about human

health safety and how genetically modified foods might put our health at risk. Organizations such as Greenpeace, Food First, and the United Nations have essentially imposed some strict regulations just to be extra cautious about GM foods being given to humans, along with preventing environmental damage. This is essentially an effort to make it more difficult to implement biotechnology in Kenya.

Other organizations, including our own U. S. government, has helped make slick marketing campaigns and biosafety training programs to essentially help get biotechnology into Kenya, as well as the whole African continent. Because of this tug-of-war that is going on here, Kenyan law and policy makers are basically bystanders in the battle. (Scoones, I. & Glover, D. , 2009) This then puts stress on them to make decisions that will not really make everyone happy, and could end up making them lose some helpful allies when it comes to supporting their citizens.

A negative impact on the economy of Kenya with biotechnology is the expensive research and development of the genetic based organisms. Kenya must ensure that it uses a patent for any technology that it produces. Another negative impact can be that Kenya may lose some of its export business if other countries do not wish to purchase agricultural biotechnology products due to a host of reasons. Since Kenya is an already under-privileged country, it is working even harder to catch up with bigger and more advanced countries.

Due to this equation, Kenya may be beat out by others that have already developed their technology to the status of developed crops and export

relationships. If there are already several export relationships that have been developed, then Kenya will be looking at an advantage to having crops for its own population but the loss of potential income to continue to serve its government and further technology advancements. Since Kenya has already struggled financially, it may rely on other countries to assist it in developing its own biotechnology systems.

It should continue to use its own developing education system to further its research and accomplishments within the industry. Another area that may cause economic crisis is that once tissue cultures are developed, additional fees may occur in the establishment of further development of crops, labor and utilities. Of course, the offset of these initial costs are the promise of further monies that could increase and multiply the economic structure of the country. Moral and/or Ethical Issues

Biotechnology has built up some moral and ethical issues all throughout its research and development. A few issues will be discussed along with their backgrounds (“playing God”, general welfare and sustainability, and distribution of benefits and workloads). Many of these issues have arisen from biotechnology being used in the world to help with the production of food and medicine. This is unfortunate because unlike other countries in the world, Kenya as well as Africa in general, is considered to be on a higher level of neediness for this technology advancement.

The ongoing debate creates fear, mistrust, and general confusion to the public, and has failed to seek the views of African policymakers and stakeholders. (Ndiritu, 2011) One such issue that has come up and is

probably one of the biggest arguments is that biotechnology has human beings attempting to “ play God”. A lot of people see the development of biotechnology to be unnatural because of the genetic manipulation that is done to modify a plant’s ability to produce more food and parts used in the production of medical supplies.

We also use biotechnology to manipulate an animal’s abilities to produce food, such as milk from a cow or to make certain animals grow larger so they can feed more people. One belief that makes biotechnology an issue is that each living thing is prescribed an “ essence” in which genes are part of that “ essence”. Another belief is that biotechnology causes us humans to go against and surpass what we are ethically allowed to do in this world. Because we surpass our ethical boundaries, we then cause disruptions to the natural order of life.

The Jubilee of the Agricultural World Address of John Paul II in 2000 mentioned that in agricultural production or in the case of biotechnology, it must not be evaluated solely on the basis of immediate economic interest but through rigorous scientific and ethical examination (Vatican, 2000 cited by International Service for the Acquisition of Agri-biotech Applications, 2006). As it can be seen, the Vatican does have an issue with biotechnology being used without first truly being researched, studied, reviewed and then evaluated at all angles.

It should be noted that biotechnology could have a larger political, social, and economic impact if it is used with great responsibility and objectivity. The Muslim religion appears to have the biggest issue when biotechnology is

used in the production of food. GM foods have to meet certain criteria in order to be acceptable for consumption by anyone in the Muslim faith. GM food containing DNA from pigs, for example, would not be accepted or consumed by Muslim people. Another big issue is the health concerns that GM foods cause to humans and to the environment.

One problem is not having legislation and bio-safety regulations implemented. This has actually caused a concern that in the absence of these regulations, biotechnologies could end up being tested in African countries prior to being released worldwide (International Service for the Acquisition of Agri-biotech Applications, 2006). In its best interest though, biotechnology is being developed with the pursuit of the greater good in mind along with the thought of sustainability. In this regard, we should not be making GM food while sacrificing the environment to do so. The moral issue and the question becomes, “ If we have a technology hat can make the lives of many people better by providing more food and better nutrition (especially to the ones who need it most), should we still use it regardless of the environmental impact? ” Finally, we have the issue of benefits and distribution. In countries such as Kenya, there is a concern with biotechnology being able to even provide a profit for the country as a whole. The questions of private companies eliminating a person’s choice of having GM and non-GM foods as well as the exploitation of GM foods and agricultural advances for medical purposes become a key argument.

Another fear is that bringing biotechnology into Kenya, and other less fortunate countries, it could end up bringing in more technical employment but at the same time eliminating labor jobs related to cultural operations. “ A <https://assignbuster.com/agricultural-biotechnology-in-kenya/>

technology's ability to increase or decrease the gap between the rich and poor renders it an ethical issue" (International Service for the Acquisition of Agri-biotech Applications, 2006). However in this case, this would probably go back to the implementation of legislation and regulations and the requirements the Kenyan government could consider while developing the biotechnology programs within the country.

Publications have been created to help solve ethical issues with R of biotechnology. Some publications are general ethical guides created by the Health Professions of South Africa. Within these materials there is specifically written information regarding agricultural biotechnology and food security in Africa. Most chapters included are geared towards the ethical issues of agricultural biotechnology development. Education is the key to developing new technologies in any society and is always going to be the case regardless of the technology being developed.

Getting people to accept and embrace new ideas is a very difficult task. In order for people to be able to accept and utilize it to its fullest extent, people need to feel comfortable with the development of the technology and its results. By putting regulations and guidelines in place, the Kenya Agricultural Research Institute (KARI) and the South African Institute for Tropical and Sub-Tropical Crops (ITSC) hope to ensure that all people are aware of the benefits and risks associated with bioengineered products and their distribution.

Kenya has also put into place a National Biosafety Committee (NBC) to oversee the public safety of these products. Since the development of

genetically modified food and medical supplies, there has been some regulation made for the scientific community to follow. Just like a doctor has ethical rules of conduct to follow, biotechnology scientists now have their own ethical rules to follow during the research and development of products made from biotechnology for medical purposes. The Health Professionals Council of South Africa has created these guidelines that each scientist is expected to follow during their research in the continent.

Four ethical duties are mentioned in these guidelines which are (1) the duty to show respect for persons; (2) the duty to alleviate suffering; (3) the duty to be sensitive to cultural differences and different cultural perspectives which individuals might bring to question health and healthcare; and (4) the duty not to exploit the vulnerable or weaker for own advantage. It continues to mention such things as allocation of resources and how Africa, South Africa specifically, does not have much to allocate to begin with.

This therefore continues to push the fact that exploitation is highly anticipated in this area of the world when it comes to biotechnology research, and it is trusted that the scientists will not be tempted to commit such immoral acts against this under-privileged population (Health Professions Council of South Africa, 2007). In addition, ethical codes have been set forth for the development of genetically modified medical supplies, but this part of biotechnology has not come under nearly as much scrutiny as GM food products.

Much research has been done to try to prove the negative along with the positive effects of GM foods. At this point it is rather difficult to take a side, at

least when it comes to using GM foods in such countries as the U. S. or England. However when it comes to Kenya and the rest of Africa, GM foods could be a blessing to the country for a number of reasons. First and foremost, it would help solve the hunger issues that are constantly seen in Kenya which is one way to help resolve the overall issues that people have against GM foods.

It would also help make crops more resistant to infestations and disease, which in turn would prevent the use of chemicals and loss of money to damaged crops. Studies have also been done to show the decrease of environmental impacts of producing GM foods. One such study that was carefully made between 1996 and 2005 by Graham Brookes and Peter Barfoot of PG Economics showed the impact on the environment by GM foods during their first ten years of commercial use. Their study showed that the uses of pesticides and herbicides had decreased by at least 15%.

Since GM foods require less cultivation to grow, the decrease in the amount of tilling done for planting crops actually saved energy and the release of carbon from the use of fossil fuels. They concluded that because of this saving of energy and prevention of carbon being released into the environment, it is about the same as taking 4 million vehicles off the road. In addition, it actually helps disturb the surrounding environment less and helps improve soil quality by tilling less (Taverne, 2007). Biotechnology has built up some moral and ethical issues throughout the history of its research and development.

These issues have been prevalent in all studies of biotechnology. The biggest argument that has arisen has been involving the genetic engineering of animals, but agricultural biotechnology has been under fire for the same reasons. Any time that someone tries to improve on something that happens naturally, there are bound to be ethical issues that arise regarding the benefits and risks of changing the course of nature. Opponents of biotechnology from a moral and ethical standpoint argue that by doing this, humans are, in effect, trying to “play God”.

Opponents also believe that animals and plants were put on the planet for a certain purpose and should not be altered, even if that purpose is enhanced in the process. The argument on the side of biotechnology is that these developments are put into place in order to improve the general welfare and sustainability of both the crops themselves and the farmers that are planting them. One of the biggest issues can be contributed to the lack of awareness of both the benefits and the risks that are associated with engineered products.

Conclusion In a country that is struggling with hunger and starvation as well as economic issues, agricultural biotechnology seems to be a simple and logical solution to the problem for Kenya. As the paper suggests, there are far more positive than negative points to be made for this technology advancement. One of the most important areas that have been developed is the growth of Kenya’s government as well as the job market. This will be extremely helpful in the economic situation as well as the opportunity for biotechnology growth.

After a review of the moral and ethical issues as well as the arguments that have been made for the technology; this paper supports that Kenya can be trusted with the growth of this important scientific discovery. Strict guidelines have been placed upon the scientists to ensure that a code of ethics has been put in place for all uses of biotechnology. Several educational factors and standards have also been put into place for the scientists as they develop the technology. The public has also been notified of their ethical and moral use of biotechnology as the products are being utilized.

As the government of Kenya becomes more educated regarding agricultural biotechnology and continued testing and development increases, there is hope that the country will not only see economic wealth but also a hope that hunger becomes a distant memory among its population. Along with this dream comes the distinct option and challenge of moving from a third world to a first world country. Biotechnology may be the invention that will turn Kenya's dream into a reality. Bibliography ABSF, (Retrieved October, 2011). Status of biotechnology in Kenya. Retrieved from http://www.absfafrica.org/index.hp?option=com_content&article=36&11 Africa Travel (Retrieved Nov 2011). Go Africa. Retrieved from: <http://goafrica.about.com/library/bl.mapfacts.kenya.htm> Avita Medical, L. d. (2011, September 7). Avita medical enters into joint venture to expand sales of ReCell® Spray-On Skin™ throughout the Middle East and North Africa. Business Wire (English). Retrieved from EBSCOhost. <http://web.ebscohost.com.proxy.devry.edu/ehost/detail?sid=752b7646-4d86-4aca-b96e-ac2fdb5f7771%40sessionmgr13&17=15&JnNpdGU9ZWhvc3QtbGl2ZQ%3d> <https://assignbuster.com/agricultural-biotechnology-in-kenya/>

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