Food and Agriculture Organization

MetMUNC XLVIII

Topic: Genetically Modified Organisms (GMOs)

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The Food and Agriculture Organization (FAO) of the United Nations is a committee that strives to diminish hunger and poverty around the world. One of the most controversial topics they currently face concerns genetically modified organisms, or GMOs.. A genetically modified organism is a living being that has had one or more genes (called transgenes) introduced into its genetic material from another organism using recombinant DNA technology.[1] In the recombinant DNA processes, the individual genes of an organism are inserted into another organism's DNA. Through this process, an organism's genomes are altered at a molecular level, because the genomes of an unrelated species code for traits that can not be procured through conventional methods such as selective breeding.[2] Genetically modified organisms offer many benefits, but they can also cause a multitude of health issues.

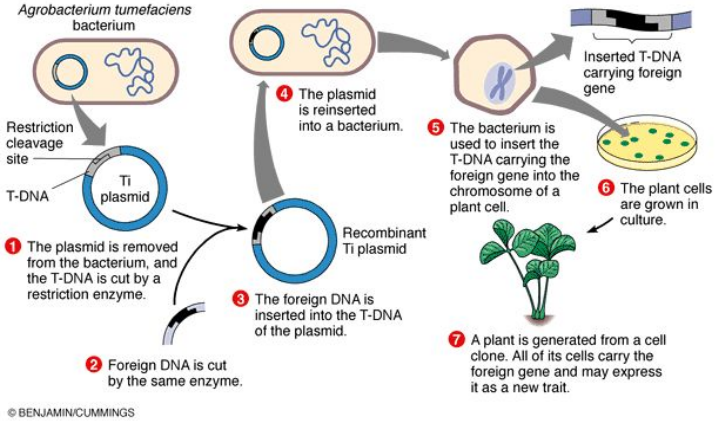

Figure 1: The recombinant DNA process required to create GMOs

[1] http://www.fao.org/fileadmin/user_upload/biotech/docs/faqsen.pdf
[2] https://www.britannica.com/science/genetically-modified-organism

Genetically modified organisms can transfer allergenic genes that can cause dangerous, potentially fatal reactions in those that are severely allergic to one of the foods being combined. This was shown in genetically modified transgenic soybeans, which received an allergenic Brazilian-nut during its testing phase, and was ultimately not released due to its content. Additionally, the transfer of antibiotic resistance can possibly occur more frequently. Unauthorized modified organisms are appearing in many major food chains. For example, GMO maize, intended only for animal feed, was accidentally used in products for human consumption. Additionally, GMOs affect the environment as well as the socio-economic features in most countries. Environmental concerns include the impact of introgression of transgenes into the natural landscape, the impact of gene flow, effects on non-target organisms, evolution of pest resistance and loss of biodiversity.[3]

The use of GMOs has a very inconsistent result when it comes to an ecosystem. In some instances, the use of a genetically modified organism can be extremely beneficial for an ecosystem and may even save one. However, in other scenarios they can be extremely destructive on an ecosystem and change how each species obtains food and where they choose to grow and develop. As herbicide resistant corn and beans were cultivated in America, environmentally-friendly tillage practices became more common around the country. The new plants did not need to be tended to as often, meaning farmers needed to use their tractors less, resulting in a huge decrease of tractor emissions. Within one year of GMO corn and soybeans being used, it has been estimated that these crops removed the equivalent of twelve million cars from the road in reduced carbon emissions.[4] This allows for animals and plants to have

[3] http://www.fao.org/3/i2490e/i2490e04d.pdf
[4] https://modernag.org/innovation/gmo-solutions-benefit-environment/

prolonged life spans as a result of the reduction of greenhouse gases that contaminate their atmosphere. By reducing the need to expand land, these GM organisms are preserving many natural habitats, thus maintaining a stable ecosystem.

Additionally, GMOs aid in controlling and protecting the food supply. GM corn, for example, are resistant to harmful pests, which devastate lands and cause billions in crop damage a year. Many GMOs are also pesticide resistant, giving them a greater crop yield. GM crops paired with genetic engineering can thus increase productivity. While GMOs may be beneficial at times, they can be detrimental to an ecosystem as well. Genetically modified organisms can inadvertently hurt insects that are very important to an ecosystem. Commonly known as the ripple effect, when one insect is in the midst of its population size diminishing, it can spread to other species that thrive on the existence of this one specific creature. By harming their population, GMOs are making ecosystems all over the world unstable, leading to many deaths of species and subsequently, ecosystems. As genetically modified organisms are not produced naturally, they can displace a food web, affecting all the other species involved. A GMO has been altered from its original genetic makeup, so it has different necessities for survival as opposed to the species it is from. The new organism may fill a different niche, which could ravage any given food chain. Protecting the food supply is a very important niche filled by GMOs, and subsequently, an ecosystem's biodiversity decreases. While GMOs are put in place to create a more efficient source of food and fuel, the damaging effects that are associated with them put the environment in harm's way.

Genetically modified organisms play a key role in the global economy as well. For instance, farmers have seen a drastic increase in their gross income, principally attributed to the

fact that they are seeing an increase in crop yields. The change in profits affects the household income as well as the farmland income. In 2014, the findings of 147 studies from 19 countries revealed that HR soybean, maize, and cotton and *Bt* maize and cotton, have increased yields by 21.5%, decreased insecticide costs by 39%, and increased profit margins by 69%. However, another analysis of 16 different countries provided that, although gross margins were increased, the cost of production increased as well. The percent yield of the GM crops were largely accountable for the direct relationship.[5]

With the existence of GMOs, the cost of food products has decreased as yield has increased. With this, many low income families that spend half their earnings on food can afford healthy food. On the other hand, with the production of GMOs, there is a larger gap in corporate size. As a result of larger companies thriving over their smaller counterparts, the food industry would have somewhat of a domination causing an increase in food prices, as a result of fewer competition. With this steady control over the food market comes a political power for the large corporations as they can influence people's opinion on the health and safety concerns many have. Finally, because GMOs have a lengthy process requiring more funds, many third world

Figure 2: Countries that allow GMOs

[5] https://www.nap.edu/read/23395/chapter/9#259

countries in Africa for example, must raise the price of production which subsequently, leads to an increase of prices in the market. These price inflations lead to a larger gap between the rich and the poor and divide society.[6] In spite of regulations installed for consumer protection, many countries still have differing views on the matter.

Currently countries such as the United States, China, India and Mexico are largely endorsing GMOs. With this comes a support from many African Countries who are repeatedly requesting the acceleration of GMO approval. In Ghana, for example, farmers face multiple hardships concerning pests and diseases, and view genetically modified seeds as a solution to their problem without utilizing harsh chemicals. In fact, recent interviews from Ibrahim Alhassan of the Juni Farmers Association and Nasiru Adams of the Northern Farmers Association provides evidence that 80 percent of annual crops are eaten away at by pesticides and chemicals from these pests jeopardize the health of many farmers.[7] On the other hand This harmful factor rises health concerns for consumers of these genetically modified organisms, therefore, giving countries in the European Union reason to withhold GMO licenses. Thus, with the many conflicting views of GMOs, countries have yet to attain an agreeable resolution that fits the needs of each nation

With the rising global population and an increase in technological developments, it is now FAO's job to determine whether or not to increase and promote the use of GMOs, leave the use of GMOs to individual nations' discretions, or attempt to dissuade the use of GMOs. The use of GMOs has risen to such a large degree, especially in developing nations, and is only

[6] https://connectusfund.org/27-big-advantages-and-disadvantages-of-genetically-modified-foods
[7] https://allianceforscience.cornell.edu/blog/2019/05/ghana-farmer-groups-demand-accelerated-approval-gmo-crops/

continuing to grow, but with controversy swirling. It is up to this committee to come together and find a compromise to the opinions on the world's reliance on GMOs.

Questions To Consider:

1. How large of a role do GMOs play in the economy of your country?
    a. Do they increase or cause a divide in the socio-economic equality aspect of the country?
2. Has food security substantially increased with the aid of GMOs?
3. Are genetic variations of crops affecting the surrounding environment?
4. Are farmers affected more than others because they are directly exposed to GMOs and their pesticides?
5. Is your country involved in aiding others fight a supposed GMO crisis through diplomatic relations?

Helpful Links:

- http://www.fao.org/fileadmin/user_upload/biotech/docs/faqsen.pdf
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3674000/
- http://www.fao.org/3/i2490e/i2490e04d.pdf
- https://ag.purdue.edu/GMOs/Pages/WhatareGMOs.aspxhttps://www.britannica.com/science/genetically-modified-organism
- https://www.nongmoproject.org/gmo-facts/