# Food and Agriculture Organization

# MUNUC 33

## ONLINE

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# CHAIR LETTER

Dear Delegates,

It is my pleasure to welcome you to the Food and Agricultural Organization. I'm Carter Squires and I will be your chair for the weekend.

A bit of background about myself: I'm a fourth year at the University of Chicago, majoring in Political Science, and I'm originally from Louisville, Kentucky [for reference, the accurate pronunciation of my hometown is "Loo-a-vul"]. Outside of MUNUC, I'm the President of UChicago's traveling MUN Team and I chair a committee for our collegiate conference, ChoMUN. Outside of school work and the MUNiverse, I research international democratic backsliding and work as a consultant for South Side-area nonprofits. When I find any free time, I try to spend it outdoors or watching any show created by Michael Schur.

The topic for this committee (The Impact of Biotechnology on Food) is extremely relevant to contemporary discussions of food safety and global hunger. I am extremely optimistic that you as delegates will work together to craft effective solutions to this pressing issue. I value collaboration and thoughtfulness and hope to see some creative solutions to these issues. Feel free to think outside the box; don't feel constrained by what the FAO might have done in the past. Rather, try to go beyond that and present novel ideas. Model UN committees are best when everyone is engaged and excited about the topic, and I hope to see everyone participating actively in the committee come February.

One last piece of advice: I know that MUN can oftentimes feel like abstract role playing, and that's not wholly inaccurate. But in the process of role-playing, don't forget that when committee is over, you'll be walking out (or logging off) into the real world. So please don't give speeches, write clauses, or make comments that disrespect your fellow delegates or are otherwise unacceptable in the real world. If you ever have a question about whether something is acceptable, please do not hesitate to ask. You will never be penalized for asking.

Above all else, we want everyone involved to have a great time at MUNUC Online! I am expecting great things from all of you, and I'm really excited to see what solutions you'll bring to the table. If you have any questions at all, please do not hesitate to reach out.

Best of luck,
Carter Squires

# HISTORY OF THE COMMITTEE

In 1945, Food and Agriculture Organization (FAO) was created as a specialized United Nations (UN) agency, in Quebec City, Canada. Currently its headquarters are located in Rome, Italy. Since its main focus has been to defeat world hunger a large part of its resources focus on developing rural areas. The FAO functions as a source of knowledge and information with data about food production and distribution around the world. In addition, the FAO acts as a neutral forum where all nations are able to meet as equals when discussions cooperates the dialog between countries to create agreements and negotiate policies. This allows all countries to modernize and improve their agricultural, forestry, and fisheries practices.

The FAO is constituted by a board of experts in the areas of agronomy, forestry, fishery, and livestock; along with nutritionists, social scientists, economists, statisticians, etc. These resources are used in order to analyze case-by-case scenarios, collect data, and disseminate solutions of development. This information is not only limited to government and official uses but it is accessible to anyone. Through different laws each nation is able to develop and solve their national struggles in alleviating hunger.

The funds used in creating the different programs come from two different sources. The first is by direct contribution of its member nations, the creation of different plans and cooperation that contribute to the development towards new programs and possibilities to the civilians of mentioned countries. In addition, there are a multitude of programs and funds through the UN system Organizations including bilateral and multilateral agreements. In 2010, for instance, the FAO oversaw over 2670 projects with a value of $903 million. These projects were funded through voluntary contributions that included: forty four percent from the Government Cooperative program; six percent through the Unilateral Trust Fund; and forty six percent through other forms of trust funds which include but are not limited to UN Joint Programs. The remaining four percent is funded through the FAO Technical Cooperation Program (TCP) and the Special Program for Food Security (SPFS).

The FAO serves as a platform for development by acquiring knowledge from different countries and programs. The FAO works closely with the World Food Programme and the Global Information and Early Warning System. This organ is particularly useful when analyzing the different pilot programs that are being prepared for deployment as FAO food security programs.

The cooperation between different countries and their involvement with a multitude of bodies give this particular organization the opportunity to tailor and create programs that satisfy the needs of different situations regarding food security, agriculture, and climate. This organization has the potential to create partnerships and discuss a wide variety of topics that affect the world today.

# TOPIC A: IMPACT OF BIOTECHNOLOGY ON FOOD

## Statement of the Problem

Attaining food security has been a daunting challenge for much of the history of civilization. In the last few decades, however, new advances in science and infrastructure have changed the way we think about food security – allowing us to use biotechnology cultivate land and think of food in a way that was not possible before. Recent advances in understanding the complexity of agriculture, as well as the development of innovative ways to transport foods needed across countries and continents, have considerably affected the global supply of food resources.

Despite the various advances in technology in the last two centuries, over 50% of deaths of children under five occur as a result of malnutrition caused by food insecurity,[1] making it more important than ever that we examine the steps taken by the international community, evaluate our progress, and think of how the Food and Agriculture Organization (FAO) can better prepare itself for continuing work in the future.

The goal of eliminating world poverty and hunger is one of the eight Millennium Development Goals set by the United Nations to improve development and living conditions worldwide,[2] and the right to food was included as a basic human right in the General Assembly's Universal Declaration of Human Rights in 1948.[3] A 2015 deadline for progress within food security was set at a 1996 conference in Rome, stating that the number of undernourished people should be cut in half from 1996 levels.[4] As the deadline approached, recognizing further progress to be made, delegates met in Rome again in 2014, adopting the Rome Declaration on Nutrition.[5]

[1] Malamy, Feeding the World in the 21st Century, 3.
[2] United Nations, "United Nations Millenium Development Goals," United Nations, http://www.un.org/millenniumgoals/.
[3] World Hunger Notes, "The Right to Food is a Basic Human Right," Hunger Notes, http://www.worldhunger.org/articles/global/foodashumrgt/special.htm.
[4] Food and Agriculture Organization. "Rome Declaration on World Food Security." 1996.
[5] "UN Milestones: Food and Nutrition." United Nations. https://research.un.org/en/foodsecurity/un-milestones.

Food security is defined as the state when "all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life."[6] Ensuring food security, along with reducing rural poverty, implementing efficient agricultural and food systems, as well as increasing the sustainability of agriculture, is central to the goals of the FAO.[7]

Attaining food security can be broken down into three major categories. First is ensuring the availability of food.[8] Availability of food is satisfied when a sustainable amount of food sources exist within a distance that can be reached by an individual in the vicinity of his or her residence, without putting undue weight on his or her current lifestyle and are consistent year round. Sources of food could include anything from a personal farm, to a town marketplace, or a grocery store.

Second, and very closely related to the availability of food, is access to food. While there may be great, nutritious food sources within a reasonable distance from one's home, the ability to transport it to one's residence is not a given, even in developed countries. If there is not sufficient infrastructure like roads and vehicles to transport food to more remote or undeveloped areas, it becomes very difficult to keep store shelves and homes stocked. Access to food can also be threatened by political turmoil or political violence obstructing the transportation mechanism necessary to distribute food. Currently in Syria, four million people suffer from food insecurity because of displacement and disruption accompanying an ongoing civil war.[9]

Finally, proper use of food is incredibly important to ensuring food security. Even if an individual finds food available and accessible, if he or she cannot do basic things like store it or cook it, the requirements for food security are unmet. Whether because of requirements set by health codes, or lack of access to cooking and storage, millions of pounds of available and accessible food are wasted every year.[10] This sort of issue exists worldwide. It is incredibly important that the international

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[6] Ibid.
[7] "What We Do" Food and Agriculture Organization, http://www.fao.org/about/what-we-do/en/.
[8] World Health Organization, "Food Security" http://www.who.int/trade/glossary/story028/en/.
[9] World Food Programme "Four Million Syrians are unable to buy or produce enough food" http://www.wfp.org/news/news-release/four-million-syrians-are-unable-produce-or-buy-enough-food.
[10] Gunders, Dana. "Wasted: How America is Losing up to Forty Percent of its Food from Fork to Landfill." http://www.nrdc.org/food/files/wasted-food-ip.pdf.

community as a whole consider the issue holistically, addressing the problem of food in-security in terms of availability, access, and proper use.

At MUNUC 33, the FAO will focus on one aspect of food security: availability. Although the combined agricultural production of the world far exceeds the amount of food required to feed everyone on the earth, millions still suffer food insecurity because food is not available where they live.[11] In recent decades, the most notable way that scientists and farmers have increased the availability of food around the world is through advances in biotechnology. Biotechnology was defined by the Convention on Biological Diversity as "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use."[12] Advances in biotechnology have already enabled countries around the world to experiment with alternative methods of producing crops, modifying the way crops grow and resist environmental pressures like drought, heat, and freezes. Biotechnology has led to the development of crops that are resistant to certain pathogens and pests, have higher crop yields, and greater resilience in times of drought. Biotechnology has created crops that could potentially alleviate food insecurity for millions.

Despite these potential benefits, the use of biotechnology to produce genetically modified organisms (GMOs) has generated ethical dilemmas. The European Union, among others, has expressed concern over the adoption of GMOs and has taken a precautionary approach towards implementing them.[13] The European Union argues that by modifying organisms, GMOs tamper with important biological processes like natural selection and other environmental pressures. Further, some believe that, by patenting the genetic sequences of GMOs and then selling them, the corporations that created them are hoarding knowledge and technology that should be publicly available. Farmers are forced either to pay high premiums for more productive, more resilient GMOs, or, in the highly likely case that they are unable to pay for GMO seed stock, relegated to grow crops that are inferior to those that have been engineered in the lab. Beyond simply charging for

[11] OxFam International. "The World Produces Enough Food to Feed Everyone." OxFam Canada. http://oxfam.ca/sites/default/files/Enough%20Food_0.pdf.
[12] Northoff, "FAO stresses Potential of Biotechnology but Calls for Caution" http://www.fao.org/waicent/ois/press_ne/presseng/2000/pren0017.htm.
[13] Joseph Murphy, Les Levidow and Susan Carr, "Regulatory Standards for Environmental Risks: Understanding the US-European Union Conflict over Genetically Modified Crops," *Social Studies of Science* 36 (2006): 3.

seedstock, most GMO producers also require that farmers only use seeds for one growing season, contrary to the thousands-of-years old practice of saving seeds for re-planting in subsequent seasons.[14] Reasonable concerns about the implementation of GMO crops are not only about biological diversity and human tampering with the environment, GMOs as they are currently sold, put farmers in developing countries, where food security is most at risk, at a distinct disadvantage in accessing the best technology.

Completely separate from the question about whether and how GMO crops should be introduced to counter food insecurity, GMOs have potential negative effects such as the loss of legal control over GMO releases, the accidental transfer of allergens and unwanted genes to non-GMO crops, the unpredictability of genetically engineered crops, and the associated, yet unknown, environmental hazards that come from changing the ecosystem with a new species.[15] Another concern is how GMO

[14] Greg Stohr, "Monsanto Wins Seed Case as High Court Backs Patent Right," Bloomberg, http://www.bloomberg.com/news/2013-05-13/monsanto-wins-seed-case-as-u-s-high-court-backs-patent- rights.html.
[15] FAO, Biotechnology and Food Security http://www.fao.org/worldfoodsummit/english/fsheets/biotech.pdf.

plants respond to sudden changes in environmental conditions. If a GMO crop is engineered to flourish in a non-arid environment, and that environment experiences drought, the GMO crop may be especially unfit to adapt to this sort of a change and may perform worse than a non-GMO equivalent. As early as 2000, the FAO voiced concerns about GMOs and stated that GMOs should be implemented with "a cautious case-by-case approach to determine the benefits and risks of each individual GMO".[16] The repercussions of putting a GMO crop in the wrong environment can lead to incredibly detrimental and lasting effects on the ecological balance of the region, the composition and fertility of the soil, and of course the food security of the communities relying on the GMO.

The delegates of the FAO are charged with assessing the viability and practicality of these technologies. How do we minimize negative effects of biotechnologies, like the potential destruction of the environment or accidental transfer of genes to other plants? Do the risks outweigh the benefits in any or all circumstances? How can the FAO ensure that the introduction of GMO crops does not further disadvantage farmers in the developing world? How does the international community deal with uncontrollable factors like weather conditions and climate change? Should it be the FAO's concern to ensure that all nations have technologies of the same caliber, regardless of any other outstanding factors involving politics, infrastructure, and their level of development? If so, how can such technology be universally implemented? By addressing these questions, the FAO will move towards combating food insecurity in a manner that is safe, productive, and accessible to everyone.

[16] Northoff, Erwin. "FAO Stresses Potential of Biotechnology but calls for Caution". http://www.fao.org/waicent/ois/press_ne/presseng/2000/pren0017.htm.

# History of the Problem

### *Origins of Biotechnology*

The foundations of today's biotechnology date back ten thousand years to the discoveries of alcoholic fermentation, or zymotechnology[17] and of the process of grafting, or taking small portions of plants or trees and using them to grow new plants.[18] The first experiments of genetic engineering, the subcategory of biotechnology that produces GMOs, were the famous pea-plant hybridizations that Gregor Mendel performed in the 19th Century. Mendel cross-bred pea plants with different physical characteristics (phenotypes) in order to study how physical traits are inherited by offspring.[19] Over one hundred and fifty years after Mendel's experiments, modern genetic engineering operates on the molecular level to select for desired physical characteristics through direct manipulation of DNA, the molecule that stores genetic material, rather than through the process of breeding.[20]

### *The Development of Genetic Engineering*

Most breakthroughs in biotechnology and genetic engineering occurred after the beginning of the 20th Century. In the same time frame, food security became an issue recognized by the international community, as a result of the sensationalist journalism of the early 20th Century; hunger issues became important to governments and people everywhere.[21] In the 1940's, American scientists began to use genetic manipulation techniques to design new or improved characteristics of plants and animals. These forbearers of GMO crops, plants engineered to resist certain environmental strains like drought or frost, were first developed in US at research institutions like the United States Department of Agriculture (USDA), Carnegie Institution for Science, Stanford University, and the University of Wisconsin. The fact that genetic characteristics could so easily be changed sparked scientific interest and led to further research on genetic manipulation at the molecular level. This research led to crops that hugely increased crop yields in the developed world, but it was not until

[17] Gibson, The Feeding of Nations: Re-defining Food Security for the 21st Century, 139.
[18] "Grafting." North Carolina State University. http://www.ces.ncsu.edu/depts/hort/hil/grafting.html.
[19] Ibid.
[20] FAO, Biotechnology and Food Security, http://www.fao.org/worldfoodsummit/english/fsheets/biotech.pdf.
[21] Ibid.

the 1960's that the developing world began to see any of these benefits. Early on in the development of agricultural biotechnology, it was already clear that the benefits of biotechnology were by default restricted to the wealthy, developed countries doing research.

***The Green Revolution: Its Effects and Questions for the Future***

A 1967 Report from the US President's Scientific Advisory Council declared that "the scale, severity and duration of the world food problem are so great that a massive, long- range, innovative effort unprecedented in human history will be required to master it."[22] In the United States, this declaration led to a response from non-profit foundations, namely the Rockefeller and Ford foundations – which worked to establish an international agricultural research network aimed to transfer and adapt the advances of biotechnology for the environmental conditions of developing nations.[23] Some of the first crops to be adapted were rice and wheat. By using improved crops and fertilizers, herbicides and insecticides developed by Ford and Rockefeller supported research, developed countries began to see incredible gains in crop yield – in many instances, yields doubled.[24] This research and implementation in the United States was the first instance where GMOs were implemented on such a broad scale, and that the engineered plants served the function that they were designed to serve. Heartened by the U.S. results, other began to use high yielding varieties (HYVs)[25] of other staples like sorghum, millet, maize, cassava, and beans. Between 1970 and 1995, cereal production doubled in China as a result of the implementation of HYVs. This boom in production was known as the Green Revolution.

Unfortunately, not all the results of the Green Revolution were positive. Most of Africa saw little or no increase in yield. While profits increased in the regions where HYVs were successful—mostly in the developed world—there was a noted increase in income inequality.[26] Large farms were be able to purchase and implement biotechnologies long before small farmers could, and thereby gained a

[22] Hazehell, Green Revolution: Curse of Blessing? http://www.ifpri.org/sites/default/files/pubs/pubs/ib/ib11.pdf.
[23] Ibid.
[24] Ibid.
[25] High yielding varieties are genetically engineered plants that are designed to maximize the amount that can be produced by a crop, so that an area of land can be utilized to grow double (if not more) the amount of usable crops than a conventional variety would produce.
[26] Ibid.

huge advantage over small farmers. In some cases, the increased supply of food drove prices down, leading to less profit per crop.[27] Beyond increasing the gap in income between large and small farming operations, this change in prices led to a massive consolidation of farm operations in many developed countries.

Environmental damage in the wake of the Green Revolution was also a problem. The widespread use of fertilizer contaminated water tables, poisoned workers, and led to a loss in biodiversity, as only a few types of crops were emphasized for production.[28] Still, this revolution did help with food shortages around the world, so it should be seen as a learning experience with some unforeseen results rather than a complete failure. While it is evident from the bad effects of the Green Revolution that not enough caution was taken in tailoring the HYVs to the ecological conditions of each region, it was also clear that HYVs had the potential to increase food production and thus, improve food security. How can the FAO improve upon the efforts made by the Green Revolution? In terms of the biotechnologies implemented in nations that are not producing enough, should they solely be GMOs? Or should we rely more on alternative methods or irrigation and natural methods of agriculture? How can the international community institute a new program (or set of programs) that deals with biotechnology at a level comparable to that of the Green Revolution? How do we ensure access of technologies to small farms is as good as for large ones?

***Biotechnologies Today***

Today, the effects of GMO crops worldwide are both positive and negative. As during the Green Revolution, biotechnology is most widely used in crops like maize, rice, wheat, sorghum, and beans. In Africa and Asia, maize is engineered to be drought tolerant. In Africa and the Indian Subcontinent poor farmers use rice, often funded through the Green Super Rice Project, which is engineered to be "stress tolerant".[29] In terms of increasing crop yields, these GMOs have been successful. However, many countries are still wary of these genetic modifications. In 2010, Haitian farmers burned 60,000

[27] Ibid.
[28] Ibid.
[29] Stress-Tolerant Rice for Africa and South Asia, "Stresses," http://strasa.org/index.php/stresses. Stress Tolerant means that it is drought tolerant, submergence, or flood, tolerant, cold tolerant, and salt/toxicity tolerant. Green Super Rice, "About Green Super Rice Project." http://thegsr.org/index.php/about-green-super-rice/

sacks of GMO seeds donated to them by the Monsanto Corporation in the wake of the Haitian earthquake that destroyed much of the island's crops. The famers argued that using GMO seeds would undermine the production of local seed stocks, and thus negatively impact biodiversity and the surrounding environment. The seeds sent to Haiti were treated with a a fungicide deemed so dangerous that agricultural workers were prohibited from handling the seeds without protective clothing.[30] This example in mind, it is crucial that the FAO consider the extreme environmental repercussions that can accompany the use of GMOs. Ensuring that toxicity is minimized, biodiversity protected, local economies undamaged, and efficiency of the crop maximized are the imperatives by which the FAO should judge the feasibility of GMO crops in developing countries GMOs can be important tools for the many regions that otherwise would not be able to ensure availability of food, but, like so many technologies, their potential downsides must be carefully weighed against potential benefits.

[30] Ibid.

# Past Actions

***UN Actions***

In May of 2013, the General Assembly and the Economic and Social Council (ECOSOC) received a report on the decisions and policy recommendations of the Committee on World Food Security, a sub-committee of the FAO.[31] The Committee's report affirmed that any agricultural technologies used must be suitable for the environment they will be used in and must have a streamlined method for implementation and operation.[32] Additionally, the FAO affirms that these technologies must be available to all, regardless of remote location or financial means.[33] The report heavily stressed the importance of discussing the impact of agricultural innovations on the environment, economy, social and cultural institutions, food security, food producers, nutrition, sustainability, access to markets for smaller producers and processors, and other areas. While the 2013 report accurately identified many of the existing open questions regarding biotechnology and food security, the document did not take steps to identify the cases where GMOs should or should not be used, nor did it address the question of implementation that it aptly poses.

In December of 2012, the Economic and Financial Committee of the General Assembly presented a resolution on agriculture development and food security resolution aimed at having developing countries determine their own specialized strategies for food security. The resolution, while recognizing that food security was an "international challenge", also placed responsibility on governments by calling it a "national policy responsibility."[34] The international community's role, according to the General Assembly, is to support food security by "transferring technology and strengthening international cooperation, particularly for developing countries, and by increasing public and private investment in sustainable agriculture, land management and rural development."[35] Again, this resolution appropriately identifies the source of the problem, and points the international community in the right direction regarding the use of biotechnology to solve issues of food security. The General Assembly resolution does not however, address the specific ways that

[31] World Food Programme. "Annual report of the World Food Programme for 2012". E/2013/14.
[32] Ibid.
[33] Ibid.
[34] General Assembly. "Agriculture development and food security." A/67/443.
[35] Ibid.

biotechnology should be implemented in the developing world, and it seems to gloss over important questions about the downside of agricultural technology for environments and economies. The FAO will have to address the questions that the General Assembly overlooked in order to create a comprehensive solution to the challenge at hand.

Additionally, the General Assembly has declared 2016 through 2025 to be a "United Nations Decade of Action on Nutrition".[36] This is designed to supplement the Rome Declaration of 2014, and calls upon the Food and Agricultural Organization and other bodies with similar goals to implement their framework for action.

***Voices of the Hungry***

Voices of the Hungry is an FAO program, implemented in 2012, to assess the extent of food insecurity around the world with the ultimate goal of better tailoring solutions to specific regions and people.[37] The initiative engaged in a global survey in 2014, 2015, and 2016, gathering data worldwide on degrees of food insecurity experienced.[38] Still, the FAO notes that while the methodology used by Voices of the Hungry is a dramatic improvement on prior methods, reporting is still far from comprehensive. Voices of the Hungry will be a useful tool for the FAO to determine whether or not current biotechnologies and agricultural methods are successful in decreasing food insecurity. While Voices of the Hungry will prove useful for developing data-driven policies on biotechnology, it is important to recognize the limits of the data it will produce. Determining a baseline for food security and insecurity around the world will not, for example, show the potential economic detriments of implementing GMO crops, nor will it take stock of how biotechnology interacts with the environment. Surveys like Voices of the Hungry can help identify need and characterize different levels and types of food insecurity, and it can assess how biotechnology improves access to food, but its narrow scope will not capture many of the possible drawbacks that can accompany GMO crops. One of the FAO's many challenges in addressing the issue of biotechnology and food security will be

[36] "UN Milestones: Food and Nutrition." United Nations. https://research.un.org/en/foodsecurity/un-milestones.
[37] FAO Statistics Division, "Voices of the Hungry: An Experienced-Based Food Security Indicator," Food and Agriculture Organization. http://www.fao.org/fileadmin/user_upload/newsroom/docs/VOH_final_COLOR.pdf
[38] "The Food Insecurity Experience Scale." Food and Agricultural Organization. http://www.fao.org/in-action/voices-of-the-hungry/fies/en/.

developing supplementary measurement tools to help determine the positive and negative effects of biotechnology on economy, environment, and society.

***Golden Rice or Fool's Gold?***

In 2000, after eight years of research, Professors Peter Beyer and Ingo Potrykus, of The University of Freiburg and ETH Zurich, respectively, published an article detailing a protocol to introduce beta-carotene into rice plants, creating a vitamin-fortified genetically modified grain: "Golden Rice."[39] Professors Beyer and Potrykus developed the GMO as a method to combat Vitamin A deficiency, a nutrient deficiency which kills an estimated 670,000 children under five every year.[40] Before Golden Rice, the international community combatted Vitamin A Deficiency through food fortification programs and vitamin supplement capsules under programs like "Vitamin A Global Initiative" and the "Micronutrient Initiative".[41] Compared to the expensive fortification and supplement programs, Golden Rice at first seems like the key to solving Vitamin A Deficiency in the developing world. Better still, Golden Rice was created with government funding and donations from various foundations and was accordingly not patented by a chemical or agricultural corporation.[42] The absence of agribusiness made it appear, at least for the first few years of the 21st Century, as though this Golden Rice would be distributed around the world free of charge.

Optimism at the prospect of Golden Rice soon waned as biotechnology companies began to intervene. Citing over forty patents on the laboratory techniques and proprietary equipment that Profs. Beyer and Potrykus used in the initial development of Golden Rice, agricultural and chemical companies sued to halt the free distribution of Golden Rice to poor farmers and began to require

[39] Karl Weber, "Part Two," in *Food Inc.: How Industrial Food is Making Us Sicker, Fatter, and Poorer-and What You Can Do About It* (New York: Public Affairs Books, 2009) 65-69, 149-153.
[40] World Health Organization, "Micronutrient Deficiencies," World Health Organization, http://www.who.int/nutrition/topics/vad/en/.
[41] United Nations Children's Fund, "Accelerating Disease Control," UNICEF, http://www.unicef.org/immunization/index_control.html.
[42] Karl Weber, "Part Two," in *Food Inc.: How Industrial Food is Making Us Sicker, Fatter, and Poorer-and What You Can Do About It* (New York: PublicAffairs Books, 2009) 65-69, 149-153.

royalty payments for any distribution or manufacture of Golden Rice.[43] It took until 2018 for the United States and Canada to allow the planting and growing of Golden Rice.[44]

Though the involved agribusiness companies have since consented to a royalty exemption for food security in developing countries, the saga of Golden Rice demonstrates that the potential problems with GMOs go far beyond concerns about negative effects once implemented. Even if the FAO decides that biotechnology such as GMOs are appropriate tools to bolster food security, the committee must overcome the legal complexity and possible 'intellectual property' obstacles inherent in the use of biotechnology. Every additional year that the distribution of Golden Rice or other innovations is delayed by legal proceedings, hundreds of thousands of children die from Vitamin A Deficiency. The FAO simply cannot declare GMOs a useful tool to combat food insecurity unless it can find a way to avoid or overcome the problems encountered by Golden Rice.

***Foundations***

Non-profit foundations, mostly in the United States, have been instrumental in the development of genetically modified, high yield, resilient crops used to promote food security. For example, non-profit foundations have recently supported the development of stress tolerant rice intended for use by low-income farmers in Asia and Africa.[45] Preliminary reports from Asia show yield improvement upon the introduction of a weed tolerant variety in Vietnam and a hybrid variety in Indonesia. Regardless of funding source however, GMO supporters, researchers, and funders have yet to address key concerns about environmental and economic impact.

[43] Ibid.
[44] Coghlan, Andy. "GM Golden Rice gets approval from food regulators in the US." New Scientist. May 30, 2018. https://www.newscientist.com/article/mg23831802-500-gm-golden-rice-gets-approval-from-food-regulators-in-the-us/.
[45] Stress-Tolerant Rice for Africa and South Asia, "Stresses," http://strasa.org/index.php/stresses.

## Possible Solutions

The set of possible solutions for the issue of biotechnology and food security are as complicated and multifaceted as the problem they address. Biotechnology is but one possible solution to improving the accessibility of food for the millions of people who suffer food insecurity, and the task of this committee is determining to what extent, and under what circumstances agricultural biotechnology is the *best* solution. Further increasing the challenge at hand, the relevant actors in the development and implementation of biotechnology are various and complex: Companies producing GMO seeds may favor instituting technological changes, while others may focus more on structural change in how their government deals with the distribution biotechnologies already in place; Some groups may strongly advocate for genetically engineered crops, others may prefer to use technologies that do not tamper with the genetic code of organisms. What must be considered, regardless of approach, is the lasting effect these changes will have on the land being cultivated and the people who work that land and rely on the food it produces. The committee must balance the dual imperatives to restrict biotechnology in order to protect environment and economy, and to use biotechnology to further increase food security for the most vulnerable populations in the world.

One of the most fundamental ways to improve food security is to make existing biotechnology for high-yield, resilient crops more available in food-insecure communities. The necessary access to the resources required to implement biotechnologies can be achieved by forging partnerships between governments and private companies or foundations. The FAO should carefully examine not only whether, but also how public-private partnerships should be implemented to most effectively address the problem of food insecurity. Creating cooperative relationships and collaboration will not only increase the implementation of biotechnologies, it can also encourage research in previously neglected regions.

Critics point out that biotechnologies are not good-without-reservation, and that the international community should not encourage further implementation of genetically engineered crops or other biotechnologies without more carefully considering the positive and negative effects. If implemented without the groundwork of careful research into the environments, societies, and economies of food insecure communities, biotechnology does stand to do more harm than it does

good.[46] Engineered crops, like any other technology, can be used well or poorly, to produce either dramatically positive or dramatically negative outcomes.

Another potential solution is for individual countries to pursue biotechnology research and to develop GMO crops specifically suited to local needs and environments. Organizations like the World Bank can be called upon to support research efforts in developing countries. Development of engineered crops in the public sector of the countries that stand to benefit most from biotechnology addresses one important facet of the problem: intellectual property and accessibility. With research funding from the international community and the public-sector commitment of developing countries to ensure accessibility for food-insecure communities, obtaining biotechnologies becomes much more feasible, and developing countries solve the issue of food insecurity using highly specialized, context sensitive tools, developed independently.

The major challenge in pursuing the above solution is intellectual capital. As seen with the Golden Rice case presented above, the field of crop engineering and GMOs is truly the cutting edge of organismal biology, and accordingly, new discoveries in the field occur at the finest, most well funded research institutions. Frequently, the countries most affected by food insecurity also lack the sort of world-class research institutions and highly educated scientists necessary to make headway in the production of GMOs. There are, if any, only a handful of countries that have both serious food security deficits and the world class research institutions necessary to research biotechnology. In order to implement this solution, the FAO must find a way to address the intellectual capital deficit present in developing countries.[47]

It is clear from above described programs like the Voices of the Hungry that the FAO has made significant progress in measuring both food insecurity and the success of programs aimed at increasing food security. While yearly reports and initiatives like the Voices of the Hungry offer the FAO valuable information on how their programs function and whether they are effective or not,[48] it

[46] Tadlock Cowan, "Agricultural Biotechnology: Background and Recent Issues." *Congressional Research Service* (2011): 2-3.
[47] Hazehell, Green Revolution: Curse of Blessing? http://www.ifpri.org/sites/default/files/pubs/pubs/ib/ib11.pdf.
[48] FAO Statistics Division, "Voices of the Hungry: An Experienced-Based Food Security Indicator," Food and Agriculture Organization.

is important that this does not just become a cycle of collecting data without addressing the problem. The FAO should look to Voices of the Hungry as an excellent example of how projects should be evaluated but should focus first and foremost on making progress to measure.

In addition to evaluating the benefits and risks of biotechnology, and planning its careful implementation, the FAO should consider how GMOs themselves could be changed to lessen negative environmental and economic impact. Many agribusinesses however, feel as though the money and time being put into the research concerning environmental concerns could be better used in researching what new varieties of staple crops they can make stronger and more resistant to environmental pressures.[49] It is the FAO's task to encourage and incentivize new research to improve biotechnology, while finding the best ways to evaluate and perhaps implement technology that already exists.

It is evident that there are a number of ways to deal with issues of biotechnology and food security, and one of the largest hurdles currently faced is assessing which of these methods are best suited for different regions, and different people. With continued cooperation, perseverance, and international collaboration, we can surely see increases in food security in the years to come. The complexity of the interaction of biotechnology and food security does not diminish the urgency of the issue. Food insecurity is one of the largest and most basic problems facing the developing world. Extraordinarily powerful and potentially dangerous technology exists to solve the problem. The FAO must find a way to address food insecurity to the greatest extent possible while minimizing the potential dangers and damages of engineered crops to economies, environments, and vulnerable communities.

[49] Karl Weber, "Part Two," in *Food Inc.: How Industrial Food is Making Us Sicker, Fatter, and Poorer- and What You Can Do About It* (New York: PublicAffairs Books, 2009) 65-69, 149-153.

## Bloc Positions

*Afghanistan, Libya, Venezuela*

The above countries suffer from a high risk of food insecurity, as war, poverty, drought, and poor governance afflict them. These factors lead to situations where countries cannot uphold the three pillars that, according to the WHO, constitute food security: access to food, food availability, and correct use of food.[50] Lack of infrastructure, for example, contributes directly to a lack of access to food. Countries in this bloc stand to benefit greatly from the use of GMO crops in order to increase the availability of food. Higher yield varieties and climate resistant varieties should help countries in this bloc provide enough food for their residents. This bloc will likely prioritize the benefits of high-yield GMOs over the potential negative effects, given that the need for food is often so dire.

*Argentina, Brazil, Guatemala, Honduras, Mexico, Peru, South Africa*

Food availability in these countries is not necessarily a major problem. Statistics show that food production, particularly grain production, has increased steadily over the last several decades.[51] However, access to this food is still limited for the poorest of the population, most likely due to increasing food prices. Therefore, complex social and income inequalities lead to hunger and under-nutrition in one large portion of the population, and malnutrition in the form of obesity in another.[52] The complexity of the food security issue in countries in this bloc makes GMOs and biotechnology a more dubiously useful solution to the problem. While GMOs, especially high yield grains, would help drive down the price of staple foods in these countries, the developing, transitioning economies would also be negatively affected by this price shock. Out of concern for smaller farmers, the negative effect of price shocks on a developing economy, and concerns over environmental

[50] World Health Organization, "Trade, Foreign Policy, Diplomacy, and Health: Food Security."
[51] Rodrigo Martinez, Amalia Palma, Eduardo Atalah, and Anna Pinheiro, "Food and Nutrition Insecurity in Latin America and the Caribbean" (Economic Commission for Latin America, 2009), http://documents.wfp.org/stellent/groups/public/documents/newsroom/wfp219558.pdf.
[52] Martinez, et al. ,"Food and Nutrition Insecurity in Latin America and the Caribbean".

degradation especially in Latin American bloc members, this bloc will likely promote very targeted use of GMOs, and stress that if they are introduced, access to them should not be price-stratified.

*Botswana, Côte d'Ivoire, Guinea Bissau, Mozambique*

The countries in this bloc have the potential to reach food security, though it will prove difficult. Bloc members still face food shortages and price fluctuations, presenting significant challenges.[53] Many of these countries have, however, taken part in programs such as the Comprehensive Africa Agriculture Development program (CAADP), aimed at reaching food security by: improving infrastructure, increasing the food supply (improving nutrition and reducing hunger), and developing sustainable land management techniques.[54] Climate change poses a significant challenge, though. Long term severe droughts have limited the positive effect of programs like CAADP, especially in the Sahel nations. However, measures developed by the government to address climate change and boost agricultural yield (such as providing incentives to farmers and attempting to stabilize the food market) can go a long way. Nations in this bloc likely see potential for GMO crops, especially grains engineered for drought resistance. Given the fragile environments and economies in these countries though, these countries are rightly wary about crops that have negative environmental impacts and unpredictable influences on regional markets.

*Belarus, Russia,*

These countries are well on their way to attaining food security. Food availability is not the main problem in this region; however, food demand has been increasing due to urbanization and population and income growth. Some estimates suggest the agricultural yield could be increased up to 75%.[55] The economic impacts of high-yield GMO crops could actually have large negative effects on the economies of this region by driving food prices down and hurting small-scale farmers. These

[53] "New Products and Analysis: 'Arab Awakening' countries at increased risk from 2013 food price shocks."
[54] Tumusiime Rhoda Peace, "African Union's Food Security Program" (presentation,
East Africa Community Heads of State Retreat on Food Security and Climate Change, Arusha, Tanzania, December 2nd, 2010).
[55] Johann Swinnen, and Kristine Van Herck, "Food Security: Challenges and Opportunities for Eastern Europe and Central Asia," *Asian Journal of Agriculture and Development*, 9, no. 1: 37.

countries: the some of the agricultural titans or breadbasket of Europe, will be rightly concerned about the effect of lower food prices (a result of high yield GMOs) on their economies.

*Iran, Nepal, Saudi Arabia, Turkey*

The countries in this bloc are at ongoing risk of food insecurity largely due to the potential for sharp increases in food prices. Because this group of countries contains some large net importers of grains, they are more vulnerable to fluctuations in the agricultural market; alongside this, they are also faced with problems such as rapid population growth and low agricultural productivity.[56] The implementation of certain strategies, however, may alleviate the negative effects of price shock. Providing nutritional education that promotes the idea of a well-balanced diet, for example, would decrease the great demand for grains. Investing in agricultural research would yield information about how to implement new technologies and combat the effects of climate change in order to increase the domestic agricultural yield.[57] These countries could also, more generally, reduce the effects of the fluctuations in the food market by using financial instruments to hedge against risk, in addition to improving infrastructure in pursuit of more efficiently distributing food. GMOs could serve these countries well both by reducing the price of staple goods on world markets, and by making food production in extremely arid climates more feasible.

*China, India, Indonesia,*

The countries in this bloc are struggling to obtain food security as food consumption patterns change. There is greater demand for wheat and protein, which, being imported staples, leave these countries increasingly vulnerable to the risk of market fluctuations and price shocks. For some countries, such as Indonesia, becoming self-sufficient in certain staples (like rice) is a possibility.[58] This can be achieved through increasing domestic production, and developing a successful international stockpiling plan, which could benefit most countries in this region. GMOs have the

[56] World Food Bank. *Improving Food Security in Arab Countries*. Washington, DC, 2009. http://siteresources.worldbank.org/INTMENA/Resources/FoodSecfinal.pdf.
[57] World Food Bank, *Improving Food Security in Arab Countries.*
[58] Chang, Belinda. Relief Web, "Southeast Asia's Food Security Challenge: More than "Stock" Solution Needed." http://reliefweb.int/report/world/southeast-asia's-food-security-challenge-more-'stock'-solution-needed.

potential to help countries in this bloc achieve their goals of food independence, but countries with fragile ecosystems should be wary of the effects that GMO crops could have upon local flora.

*Bahamas, Cyprus, Fiji, Maldives, Nauru, Tonga*

These countries are at a higher risk of food insecurity. They are faced with unique challenges, such as their small size, which makes them almost entirely dependent on imports. Their vulnerability to natural disasters can cause the agricultural sector to suffer immense losses.[59] In addition, after such calamities, food crises can last for weeks, due to the obvious interruption of food supply. Therefore, governments must take initiatives in disaster risk management, such as developing early warning systems. Another key to improving accessibility to food is developing transport and storage facilities, which can, among other things, link poor rural farmers to cities where food might be scarce.[60] Tailor- made GMOs could help these countries become agricultural producers, but at the same time could wreck their unique island biomes. These countries should be wary about the potential for environmental damage by GMOs even as they consider their use in pursuit of food security.

*Australia, Canada, Denmark, France, Germany, Ireland, Italy, Japan, South Korea, United Kingdom, United States*

The countries in this bloc have reached high levels of food security. Food is available on a consistent basis, access to food is generally unlimited, and the public is generally knowledgeable about basic nutrition and use of foods.[61] These countries are also home to the research institutions and agricultural businesses that design and produce most of the agricultural biotechnology and GMO crops. Given that food security is not a pressing issue in these countries, the risks of GMO crop seem to consistently outweigh the benefits. Even as governments in Europe, for example, support the distribution of fortified grains as part of food aid, The European Union has heavily regulated the use

[59] K.L. Sharma, "Food Security in the South Pacific Island Countries with Special Reference to the Fiji Islands." (United Nations University, June 2006).
[60] K.L. Sharma, "Food Security."
[61] World Health Organization, "Trade, Foreign Policy, Diplomacy, and Health."

of GMOs. For the countries in this bloc, GMOs raise the question of balancing business interests with the potential for environmental and health impacts.[62]

[62] "EUROPA - Food Safety - Biotechnology - Introduction." EUROPA - Food Safety - Biotechnology - Introduction. http://ec.europa.eu/food/food/biotechnology/index_en.htm.

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