RENMUN VII

Peace in Permanence

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Chair Report

Chair Introduction

Welcome delegates!

My name is Kadence Wong from ESF Sha Tin College, and I am head-chairing UNEP alongside my Deputy Chair Cedric Poon. It is an honour and a pleasure to be serving in this position, and we look forward to productive discussions amongst delegates.

The United Nations Environment Programme is an organisation that focuses on scientific assessments and projects to stimulate international policy responses related to climate, pollution, sustainable development and more. The UNEP also assists in creating guidelines and treaties on environmental issues like the *Convention on Biological Diversity* or the *Convention on International Trade in Endangered Species of Wild Fauna and Flora*.

Please read the chair reports carefully; however, we do not recommend using the chair reports as your sole consulting materials as they will likely not cover the issue in enough depth! We strongly encourage you to thoroughly research your country's stances for upcoming debates and resolution-writing too.

Nonetheless, whether you are joining a MUN conference for your first or fifteenth time, we hope you will actively participate in the debate over the two days of discussion. As chairs, our wish is that you receive a fun and meaningful experience whilst developing a deeper understanding of global issues.

If you have any questions, queries or concerns, please feel free to contact either of us.

Best wishes,

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Addressing the safety of genetically modified (GM) foods in Food and Agriculture

According to the World Health Organisation (WHO), genetically modified organisms (GMOs) are organisms where the genetic material has been modified in a way that could not occur by itself in nature. Often referred to as “gene technology” or “modern biotechnology”, genetic engineering allows selected individual genes to be transferred from one organism into another, often between non-related species.

However, the term “genetic modified organisms (GMO)” has gradually become a controversial topic in public spheres. Increasing concerns about GMOs - particularly in the form of genetically modified (GM) foods - question the short and long-lasting health problems that may result from such technology. Debates about GM food’s benefits to food producers and consumers continue, with countries also considering the potential biomedical risks and environmental side effects from their usage.

Key Terms

Term	Definition
Genetically-modified Organisms (GMOs)	Genetically modified organisms (GMO) are organisms whose genome has been engineered in the laboratory to favour the expression of desired physical traits or products
Transgenic crops	A GM or transgenic crop is a plant that has a novel combination of genetic material obtained through the use of modern biotechnology
Breeding	The science of changing the traits of plants and animals to produce desired characteristics
Malnutrition	A lack of proper nutrition, caused by not having enough to eat, not eating enough of the right things, or being unable to use the food that one does eat
Biotechnology	The exploitation of biological processes for industrial and other purposes, especially the genetic manipulation of microorganisms for the production of antibiotics, hormones, etc

Biodiversity	The variety of plant and animal life in the world or in a particular habitat, a high level of which is usually considered to be important and desirable
Pest/herbicide resistance	A condition where pests (insects, small animals, mites, weeds, etc.) are able to resist, and therefore do not get affected, by pesticides OR the inherited ability of a plant to survive and reproduce. following exposure to a dose of herbicide that would normally be lethal to the wild type
Antitrust enforcement	Consisting of laws to protect trade and commerce from too much market control or unfair business practices

Background Information

WHAT ARE GM FOODS?

The beginning of genetic engineering can be traced back to 1944 when scientists discovered that genetic material can be transferred between species. Soon, genetic engineering made its way to the food and agriculture sector, creating GM foods - genetically modified plants and animals that are used in agriculture.

The development of GM foods can be split into 3 stages, each stage targeting a different aspect of agriculture. The first foods were developed for animal or human food and to provide resistance from pests, environmental conditions, diseases, spoilage or chemicals. The second stage of crops sought to improve quality by altering nutritional content. Meanwhile, third-generation GM foods were adapted for other purposes like biofuels and medicine. As of today, commercialised GM crops are limited mostly to profit crops like cotton, maize/corn, soybean and canola, with the vast majority of introduced traits providing either herbicide/insect resistance or improved nutrient profiles.

REASONS BEHIND GMO FOODS

According to a scientific paper titled *Genetically modified foods: A critical review of their promise and problems*, there are three main reasons why genetically modified foods have become - and will continue to be - important in the food and agriculture industry.

1. **Expansion of population**

The current global human population stands at approximately 7.35 billion people and is predicted to grow to ~10 billion people by 2050. The rapid expansion of the population is one of the major contributing factors to undernourishment globally. In 2016, the U.N. Food and Agricultural Organisation (FAO) estimated that 795 million people in the world were undernourished.

One of the most realistic solutions for matching increased global demand for food is boosting crop yields on currently cultivated land. Currently, the increase in crop yield is less than 1.7% annually whereas the annual increase in yield needs to be 2.4% to meet demands from population growth. With the world increasingly threatened by climate change - a phenomenon that puts stress on water and soil systems - GM crops may be the way to meet demands for agricultural productivity and added nutrition.

2. The bottleneck of conventional and modern breeding

Traditional breeding requires the sexual crossing of one parental line with another parental line in hopes of expressing the desired property. To select for the desired trait and dilute undesired traits, breeders have to choose the best sample and cross it with one of its parents. The process usually takes years before the expression of the desired trait can be assessed, and further expanded to commercially useful numbers. Nowadays, genetic variety has dwindled, leading to restricted space for improvement. GM crops do not require many generations to breed or a limited gene pool, hence they can be used to introduce new breeds that are more agricultural efficient and provide better nutrition.

3. Pests and Crop Diseases

Annual crop loss to pests alone accounts for 20–40% of the global crop losses. In terms of economic value, tackling crop diseases and epidemics and invasive insect problem costs the agriculture industry approximately $290 million annually. Currently, major epidemics also continue to plague commercial agriculture. GM crops - with traits like herbicide resistance, crop disease resistance, insecticide properties and more - can help combat such epidemics and improve the health (and therefore efficiency) of the agricultural system as a whole.

BENEFITS OF GMO CROPS

1. Increased agricultural productivity

Over the last 20 years, food crop production has increased by more than 370 million tons. One-seventh of the increased yield, or up to 25 per cent, is attributed to GM crops in the U.S. To achieve an equal increase in yield delivered by GM crops, it is necessary to add more than 300 million acres of conventional crops. These additional 300 million acres would require more fertilizer and irrigation, as well as carving out

tropical forests. Such conversion of land would likely create ecological and environmental stress to the land if GM crops are not available.

2. **Economic benefits**

From 2006 to 2012, the global increase in farm income from GM food reached $116 billion. About 42% of the economic gain was from the increased yield due to advanced genetics and resistance to pests and weeds. The decreased costs of production (e.g. from reduced pesticide and herbicide usage) contributed to the remaining 58%. This benefits farmers as increased productivity of agriculture raises farm incomes, increases food supply, reduces food prices, and provides greater employment opportunities in both rural and urban areas.

3. **Modification of nutrition in food**

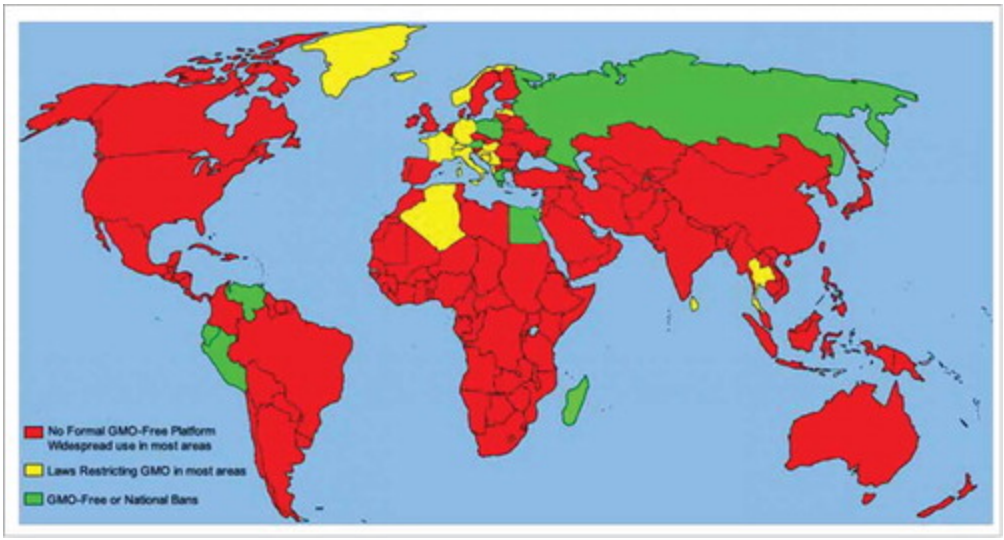
Certain GM crops are modified to enrich certain nutrients or substances having high therapeutic and pro-health value, including vitamins A, C, E, unsaturated fatty acids, alimentary cellulose and probiotics. One such example is “Golden Rice”, rice modified to include higher quantities of Vitamin A to combat deficiency. Similarly, researchers can also alter the amino acid composition of proteins as well as carbohydrates. The former is exemplified by sweet lupine, of which the content of methionine is enriched, while an example for the latter is Amflora, a modified potato variety. GMOs can help ameliorate malnutrition in an effective and economic way.

4. **Improvement in food processing**

GM technology can also facilitate food processing. A notable example is “Flavr Savr” tomatoes, produced by California company, Calgene, in 1992. The genetic alteration consists of the introduction of an antisense gene, which suppresses the enzyme polygalacturonase; the consequence is to slow down the ripening of tomatoes and allow longer shelf life for the fruits.

Potential Clashes

GMOs have incited public debate in many parts of the world around areas like the release of GMOs into the environment and the marketing of GM foods. Even though the issues under debate are usually very similar (pros and cons, safety issues) from country to country, the extent and depth of debate vary. On issues such as labelling and traceability of GM foods, there is no worldwide consensus to date.



The figure depicts the current acceptance of GM crops in different countries. Green: National bans. Yellow: Restrictive laws. Red: No formal laws.

GMO Crops and Effects on the Human Body

Different GM organisms include different genes inserted in different ways. This means that individual GM foods and their safety should be assessed on a case-by-case basis and that it is not possible to make general statements on the safety of all GM foods. However, there are still concerns about the effects of GMO foods on the human body. Three major health risks potentially associated with GM foods are toxicity, allergenicity and genetic hazards. These arise from the potential sources, the inserted gene and their expressed proteins, and the possible disruption of natural genes in the manipulated organism.

Allergenicity

One example is the production of soybeans enriched in the amino acid methionine. The enhanced synthesis of this amino acid is the result of a gene isolated from Brazil nuts. As a consequence, some consumers allergic to these nuts have allergic reactions to the GMO soybean as well.

Most of the time, the transfer of genes from allergenic organisms to non-allergic organisms is discouraged unless it can be demonstrated that the protein product of the transferred gene is not allergenic. Currently, protocols for the testing of GM foods regarding allergenicity have been evaluated by the Food and Agriculture Organisation (FAO) and the WHO.

Gene transfer

There are concerns that the technology that genetically modifies an organism carries the risk of transferring the genes of antibiotic resistance into benign bacteria

comprising the microflora of human and animal gastrointestinal tracts. Worse yet, some hypotheses that the genes of antibiotic resistance will be transferred to pathogenic bacteria, causing many health problems that can create an epidemic.

Outcrossing

The movement of genes from GM plants into conventional crops or species in the wild may have an indirect effect on food safety and food security. As of now, several places like the EU have already adopted strategies to reduce mixing, such as a clear separation of the fields within which GM crops and conventional crops are grown.

PATENTS & CORPORATE POWER

Certain groups are concerned about what they consider to be an undesirable level of control of seed markets by a few companies. The GM seed market is currently consolidated by the "big four" companies: Monsanto, DuPont, Syngenta, Dow, Bayer, and BASF. As of 2021, they account for 66% of the market.

Sustainable agriculture and biodiversity benefit most from the use of a rich variety of crops, both in terms of good crop protection practices as well as from the perspective of society at large and the values attached to food. These groups fear that as a result of pressure from the 5 companies, the range of varieties used by farmers may be reduced mainly to GM crops. The exclusive use of herbicide-tolerant GM crops would also make the farmer dependent on these chemicals, which many consider unsustainable.

DEVELOPMENT OF SUPERWEEDS & SUPER PESTS

Currently, the majority of GM foods are aimed at endowing the altered plant with two desirable properties – pest resistance or herbicide resistance.

The use of these two technologies greatly reduces immediate input costs incurred by farmers – for one, the battle against weeds becomes much less labour-intensive, and the battle against insects requires much less expensive and toxic pesticides. However, people are concerned that heartier weeds and insects will respond to the human-made pressures in their habitats by evolving in ways that nullify the design of transgenic crops.

Key Stakeholders

Stakeholder	Involvement with the Issue
Philippines	The Philippines is considered a leader of developing nations in the adoption of GMO technology. As of 2013,

	the Philippines is ranked 13th for the total area of biotech crops planted — 812,00 hectares. Genetically modified maize is the dominant crop in the country, with 65% of farmers using GM seeds; meanwhile, public-private sector collaborations are expected to lead to further commercialization of GM rice, cotton, eggplant, and papaya. However, the adoption of GMOs has not been without controversy. In December 2015, a Supreme Court decision stopped field trials of genetically modified eggplant and voided existing biotechnology regulations. While the decision was overturned six months later, it forced the Philippine government to implement new GMO regulations that provided more consideration to socioeconomic issues and environmental impacts. Further regulations are expected, with the aim of maintaining the growth of GM crops and trade while considering the concerns of the public.
United States of America	The United States is the largest grower of GMO crops in the world. Since GMOs were first approved for commercial use and planted in U.S. soil in 1996, their production has rapidly increased. The most common GMO crops in the U.S. include soybean, maize, cotton, canola, and alfalfa. For GM crops to be approved for release, they first have to be assessed by the US Department of Agriculture, the Food Drug Administration and the Environmental Protection Agency. The USDA evaluates the plant's potential to become weeds, the FDA reviews plants that could alter the food supply and the EPA regulates the genetically modified plants with pesticide properties. Many U.S. based organisations oppose or have concerns about genetic engineering for different reasons. Groups like the Centre for Food Safety, the Union of Concerned Scientists, Greenpeace and the World Wildlife Fund have expressed concerns about the FDA's lack of a requirement for additional testing for GMOs and the lack of required labelling.

European Union	Until the 1990s, Europe's regulation was less strict than in the United States. However, in 2003, the EU enacted a suspension on new approvals of GMOs pending new regulatory laws. Currently, EU law requires that all GM food be traceable to its origin and that all food with GM content greater than 0.9% is labelled. Due to high demand from European consumers for freedom of choice between GM and non-GMO foods, EU regulations require companies to avoid mixing GM crops and conventional/organic crops. As of 2014, Spain has been the largest producer of GM crops in the EU averaging 137,000 hectares (340,000 acres) of GM maize per year. Smaller amounts were grown in the Czech Republic, Slovakia, Portugal, Romania and Poland. Meanwhile, France and Germany are major opponents of genetically modified food. Other European countries like Austria, Hungary, Greece, Bulgaria and Luxembourg have also placed bans on the cultivation and sale of GMOs.
Brazil	In South America, Brazil leads the development and expansion of GMOs. In 2016, Brazil was ranked second behind the United States in the area of GM crop growth with a total of 49.1 million hectares. The introduction of the growth of GMOs followed soon after the 2003 election of new Brazilian president Luiz Inácio Lula da Silva, who introduced the 'Zero Hunger' program. Its aim was - with the help of GM crops - to eradicate hunger and poverty at a time when half of the nation's households did not have access to secure food sources or proper nutrition. By April 2003, Brazil had ratified the United Nations Cartagena Protocol on Biosafety, and by 2005 they had introduced legislation establishing the regulatory framework to produce and market GMO crops within the country. Today, it is reported that there were 68 GMO seeds approved for commercial cultivation in Brazil such

	as corn, soybean, cotton, and eucalyptus.
Non-Governmental Organisations (NGOs)	For a long time, GMOs have been opposed by a variety of not-for-profit nongovernmental organizations (NGOs). Much of the opposition has been led by European-based organizations such as Greenpeace International and Friends of the Earth International, as well as U.S and Canadian NGOs like the Center for Food Safety. The campaigns these organizations have going on for almost 2 decades. Many are successful, particularly the blocking of GMO food crops. GMO wheat, GMO rice, GMO potato, nearly all GMO fruits and vegetables, GMO food animals and GMO fish have all been kept off the market. Nearly all of the GMO crops planted today are used for industrial purposes or as animal feed. However, there are occasionally anti-GMO activists who change their minds. For example, Patrick Moore, a past head of the Greenpeace Foundation in Canada, announced his support for Golden Rice as a way to mitigate vitamin A deficiency in developing countries. U.K. environmentalist Mark Lynas also recently apologised for his role in launching the anti-GMO campaign in the 1990s. He characterized this campaign as extremely successful but admitted that it was misguided.
Corporations	As of 2021, 4 large corporations dominate the GMO market: *Monsanto, Bayer CropScience, Dupont, Syngenta and Groupe Limagrain*. All sell GMO seeds and associated products (e.g. pesticides), as well as a range of non-GMO seeds and products supporting agricultural production. For years, these corporations have faced criticism for their role in GMO development, with campaigns pushing back against them for their impact on health and the environment. Despite the backlash, many of these corporations seek to work with governments and farmers to improve opportunities in the agricultural sector. For example,

	Bayer helps farmers improve their chemical and biological plant protection via improved seeds and direct advice on the farm, whilst Monsanto helps farmers get access to modern tools to increase yields, protect the environment and improve the quality of life for farmers and their families.

Possible Solutions

Fair and affordable access to seeds and the right for farmers to save seeds
Seed systems that generate profits for all stakeholders - growers, buyers, distributors and sellers - may be part of what is needed for sustainability. This is because making a profit from a crop in a developing country can substantially improve the livelihood of farmers and their families, whilst also increasing potential yields and hence the ability to support a larger population.

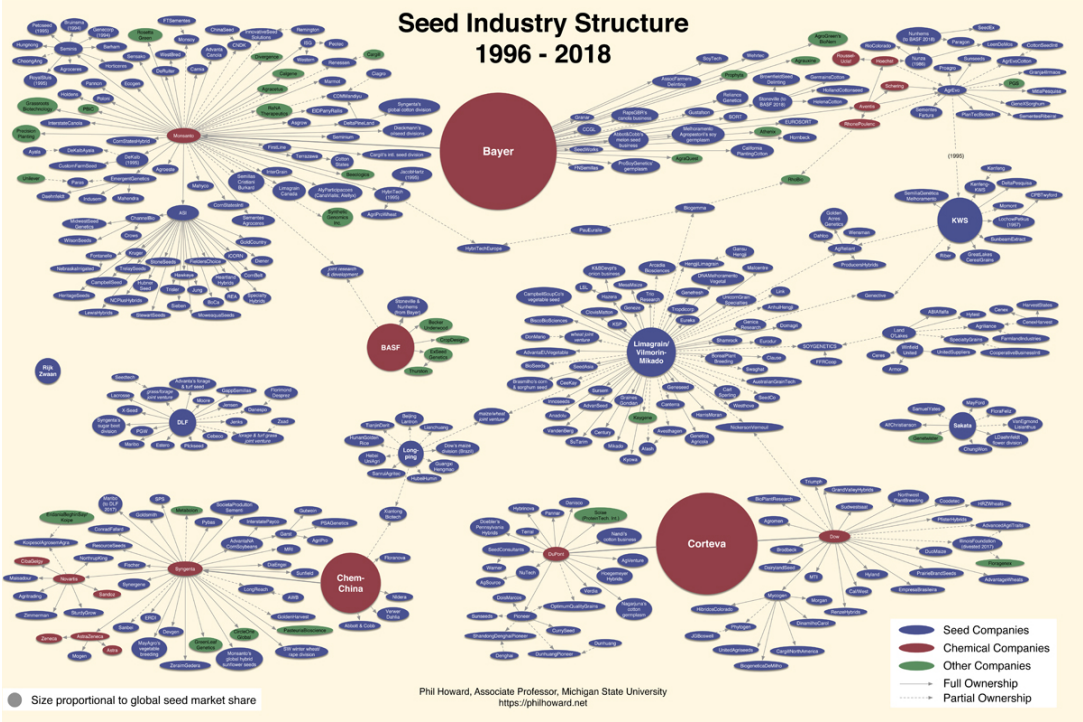
There are worries about corporate greed, which is why certain parties are concerned about farmers' fair and affordable access to seeds. For example, Juliet Perry, representative of Greenpeace's Asia Pacific Communications Hub said, *"GE [genetically engineered] crops are used as a lure to make farmers dependent on buying seeds and agrochemicals every year from big corporations that market them as wonder crops. The reality is vastly different, but once hooked, farmers lose control of the seeds they once used and are unable to continue using ecological pest management. Instead, farmers have no choice but to buy the full package of pesticides that need to be used with the GE seeds to ensure they perform."*

Still, the public sector has often complemented seed-related research and development activities by the private sector. However, the area of GMOs, particularly GM crops, is difficult for public institutions due to rigid regulatory requirements, approval delays, and unpredictability in political policies that determine their activities. Therefore, public-private partnerships like the African Biofortified Sorghum project or Golden Rice project can allow public institutions to participate in the development and commercialization of GM crops.

Increased funding for public plant and animal breeding to develop locally and regionally adapted seed and breed varieties
To ensure GMOs do not create issues like super pests, superweeds or overcrossing, local organizations and research bodies need to understand their products and how they need to be tailored to meet local challenges such as pests, weeds, and diseases.

For example, a maize seed was developed that is adapted to environmental conditions in East Africa. The crop had tolerance to a disease new to East Africa called maize lethal necrosis which was causing severe crop loss. Another example would be the launch of a new non-GM hybrid rice variety with strong inbuilt resistance to Brown Plant Hopper and Bacterial Leaf Blight, diseases that dramatically reduce overall yields and the grain quality of the final product as infested rice grains tend to be lightweight and chaffy.

Antitrust enforcement in the highly concentrated private seed sector



When Philip Howard of Michigan State University published the first iteration of the seed industry consolidation chart in 2008, it illustrated how six corporations dominate most of the brand-name seed market. Many were starting to enter into acquisitions and mergers with competitors that may weaken competition.

New findings show that the 6 (Monsanto, DuPont, Syngenta, Dow, Bayer, and BASF) have turned into 4 dominated by Bayer and Corteva. These four firms control more than 60 per cent of global proprietary seed sales.

Biotech companies to be held accountable for GMO contamination, including the standardisation of labelling & packaging on foods, and separating GMO and conventional/organic products

The contamination of crops by neighbouring GMO crop fields can create problems for farmers, consumers and the environment. For example:

- GMO contamination can undermine organic farmers' farming practices and affect the premium price they receive for their crops.
- Conventional non-GMO farmers may have their crops rejected in global export markets as a result of GMO contamination. Farmers whose crops have been contaminated are also at risk of being sued for patent infringement by biotech companies. For instance, 145 farmers have been sued by Monsanto for patent infringement.

Therefore, some ideas for ways that biotech companies can be held accountable for GMO contamination could be to:

- Set up a body to fully investigate the state of contamination in seed and food supplies;
- Regulate GMOs based on their potential for economic harm as well as safety, with stronger independent review and oversight of GMO crops and animals prior to their approval and following their release into the environment and marketplace
- Prevent GMO contamination by issuing mandatory contamination prevention measures.
- Have biotech compensate for contamination

Education and Open Dialogue

Currently, many activist groups focus on the health and environmental hazards of GMOs to justify their banned use. However, many scientific bodies and other groups have denounced such claims as misinformation, believing it is vital to engage in an open dialogue with stakeholders to address persistent concerns and communicate how plant breeding innovation works.

Representatives of the big 4 corporations also point out that they provide options for seed in developing countries, and are enabling choice — not pushing GMO. For example, Bayer's spokesperson, Hoger Elfes, says, "*as much as we are convinced of the benefits that GM crops bring, we support farmers' and consumers' free choice on what to grow and what to eat. We supply conventional and untreated seeds to organic and conventional farmers as well as biotech seeds to the farmers who want and are allowed to plant them. At the consumer level, we support uniform food labelling to provide reliable and understandable information on the health, safety, and nutritional value of foodstuffs. "*

Past Actions

The United Nations Convention on Biological Diversity (1993)

The United Nations Convention on Biological Diversity was signed at the 1992 United Nations Conference in Rio de Janeiro and then ratified in December of 1993.

This convention was created as a response to international concerns over the potential effects of GMOs on biodiversity and the testing of biotechnology in developing countries. The CBD sets the foundation for GMO regulation in a unique form. First, it calls for the creation of a protocol for the safe transfer of GMOs; second, it takes environmental protection further by 'freeing' the 'precautionary principle' from economical considerations or the cost of precautionary measures as previously stated in the Rio Declaration. Third, the CBD takes into account that most of the genetic resources are located in developing countries by addressing technology transfers from developed to developing countries. Lastly, it also asserts the rights of states to genetic and biodiversity resources located in their territories.

Biodiversity protection is left to the states, and they can "develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity". Such measures may include appropriate measures to "prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species". Precautionary measures in the Convention include risk assessments, which states are compelled to undertake when activities "are likely to have significant adverse effects on biological diversity with a view to avoiding or minimising such effects". In addition to states' measures to preserve biological diversity, the CBD sets the basis for a comprehensive approach to GMO regulation, specifically in article 19, which calls for the establishment of a protocol, whereby procedures such as the Advance Informed Agreement, are implemented for the "safe transfer, handling and use of any living modified organism that may have an adverse effect on the conservation and sustainable use of biological diversity".

The Cartagena Protocol on Biosafety (2003)

The Cartagena Protocol on Biosafety, an environmental treaty legally binding for its Parties which took effect in 2003, regulates transboundary movements of GMOs.

The Protocol provides countries with the necessary information to make informed decisions about whether or not to accept GMO imports. Governments will have to adopt measures for managing any risks identified by risk assessments and continue to monitor and control any risks that may emerge in the future. This applies to traded as well as domestically produced GMOs. GM foods are within the scope of the Protocol only if they contain LMOs that are capable of transferring or replicating genetic material. The cornerstone of the Protocol is a requirement that exporters seek consent from importers before the first shipment of LMOs intended for release into the environment.

Guiding Questions

1. What are the risks and (unintended) consequences of GMOs on ecological and agricultural systems?
2. To what extent do national and international regulatory frameworks (including labelling requirements) influence world trade and food distribution?
3. How can we protect consumer choice and ensure public trust in food systems?
4. What are the limitations of science and how much uncertainty is acceptable to consumers?
5. Are people's reactions to GMOs related to the different attitudes to food in various regions of the world?
6. How can we quantitatively determine the potential risks of GMOs to human health?
7. Are there implications for the rights of farmers to own their crops?

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