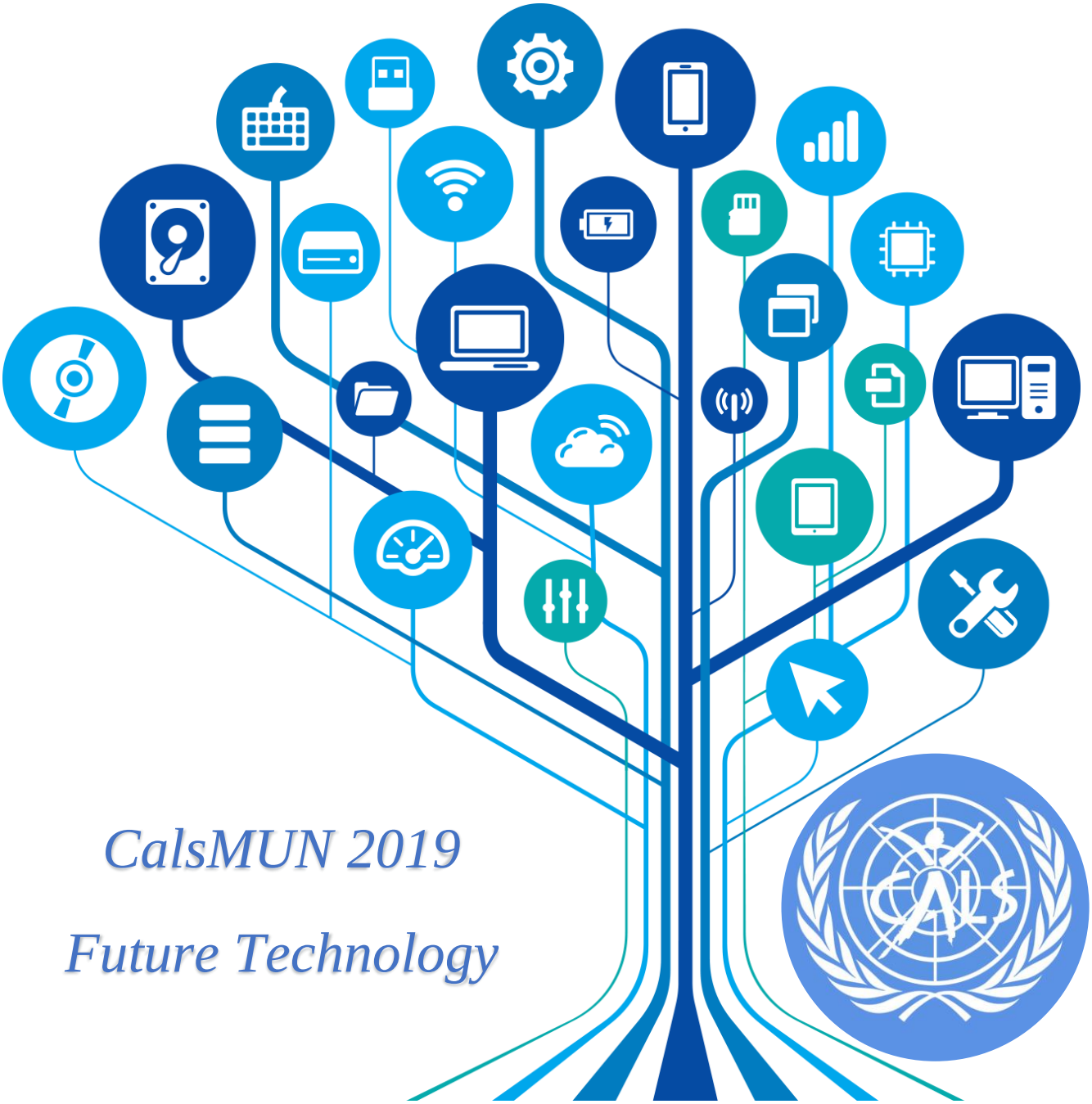

CalsMUN 2019

Future Technology

Research Report

Forum: Food and agriculture organisation

Issue: The use and development of GMO's

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Introduction

People have been altering the genomes of plants and animals for many years using traditional breeding techniques. Artificial selection specific, desired traits have resulted in a variety of different organisms, ranging from sweet corn to hairless cats.

Today, we can incorporate new genes from one species into a completely unrelated species through genetic engineering, optimizing agricultural performance or facilitating the production of valuable pharmaceutical substances. Crop plants, farm animals, and soil bacteria are some of the most prominent examples of organisms that have been subject to genetic engineering.

Definition of Key Terms

GMO's

A genetically modified organism (GMO) is any organism whose genetic material has been altered using genetic engineering techniques. GMOs are used to produce many medications and genetically modified foods and are widely used in scientific research and the production of other goods. The term GMO is very close to the technical legal term, 'living modified organism', which regulates international trade in living GMOs (specifically, "any living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology"

Genetic engineering

Genetic engineering, also called genetic modification, is the direct manipulation of an organism's genes using biotechnology. It is a set of technologies used to change the genetic makeup of cells, including the transfer of genes within and across species boundaries to produce improved or novel organisms.

General Overview

Why are GM foods produced?

GM foods are developed – and marketed – because there is some perceived advantage either to the producer or consumer of these foods. This is meant to translate into a product with a lower price, greater benefit (in terms of durability or nutritional value) or both. Initially GM seed developers wanted their product to be accepted by producers and have concentrated on innovations that bring direct benefits to farmers.

One of the objectives for developing plants based on GM organisms is to improve crop protection. The GM crops currently on the market are mainly aimed at an increased level of crop protection through the introduction of resistance against plant diseases caused by insects or viruses or through increased tolerance towards herbicides.

Resistance against insects is achieved by incorporating into the food plant the gene for toxin production from the bacterium Bacillus thuringiensis (Bt). This toxin is currently used as a conventional insecticide in agriculture and is safe for human consumption. GM crops that inherently produce this toxin have been shown to require lower quantities of insecticides in specific situations, e.g. where pest pressure is high. Virus resistance is achieved through the introduction of a gene from certain viruses which cause disease in plants. Virus resistance makes plants less susceptible to diseases caused by such viruses, resulting in higher crop yields.

Herbicide tolerance is achieved through the introduction of a gene from a bacterium conveying resistance to some herbicides. In situations where weed pressure is high, the use of some crops has resulted in a reduction in the quantity of the herbicides used.

What are the main issues of concern for human health?

Allergenicity

As a matter of principle, the transfer of genes from commonly allergenic organisms to non-allergic organisms is discouraged unless it can be demonstrated that the protein product of the transferred gene is not allergenic. While foods developed using traditional breeding methods are not generally tested for allergenicity, protocols for the testing of GM foods have been evaluated by the Good and Agriculture Organization of the United Nations (FAO) and WHO. No allergenic effects have been found relative to GM foods currently on the market.

Gene transfer

Gene transfer from GM foods to cells of the body or to bacteria in the gastrointestinal tract could cause concern if the transferred genetic material adversely affects human health. This would be particularly relevant if antibiotic resistance genes, used as markers when creating GMOs, were transferred. Although the probability of the transfer is low, the use of gene transfer technology that does not involve antibiotic resistance genes is encouraged.

Outcrossing

The migration of genes from GM plants into conventional crops or related species in the wild (referred to as “outcrossing”), as well as the mixing of crops derived from conventional seeds with GM crops, may have an indirect effect on food safety and food security. Cases have been reported where GM crops approved for animal feed or industrial use were detected as low levels in the products intended for human consumption. Several countries have adopted strategies to reduce mixing, including a clear separation of the fields within which GM crops and conventional crops are grown.

What are the issues of concern for the environment?

Issues of concern include: the capability of the GMO to escape and potentially introduce the engineered genes into wild populations; the persistence of non-target organisms to the gene product; the stability of the gene; the reduction into the spectrum of other plants including the loss of biodiversity; and increased use of chemicals in agriculture. The environmental safety aspects of GM crops vary considerably according to local conditions.

The way governments have regulated GM foods varies. In some countries GM foods are not yet regulated. Countries which have legislation in place focus primarily on assessment of risks for consumer health. Countries which have regulatory provisions for GM foods usually also regulate GMOs in general, taking into account health and environmental risks, as well as control- and trade-related issues (such as potential testing and labelling regimes). In view of dynamics and debate on GM foods, legislation is likely to continue to evolve.

What is the state of public debate on GMOs?

The release of GMOs into the environment and the marketing of GM foods have resulted in a public debate in many parts of the world. This debate is likely to continue, probably in the broader context of other uses of biotechnology and their consequences for human societies. Even though the issues under debate are usually very similar (costs and benefits, safety issues), the outcome of debate differs from country to county. On issues such as labelling and traceability of GM food as a way to address consumer preferences, there is no consensus to date.

What further developments can be expected in the area of GMOs?

Future GM organisms are likely to include plants with improved resistance against plant disease or drought, crops with increased nutrient levels, fish species with enhanced growth

characteristics. For non-food use, they may include plants or animals producing pharmaceutically important proteins such as new vaccines.

Major Parties Involved

Organisations

World Health Organisation

Who has been taking an active role in relation to GM foods, primarily for two reasons:

- On the grounds of public health could benefit from the potential of biotechnology, for example, from an increase in the nutrient content of foods, decreased allergenicity and more efficient and/or sustainable food production; and
- Based on the need to examine the potential negative effects on human health of the consumption of food produced through genetic modification in order to protect human health. Modern technologies should be thoroughly evaluated if they are to constitute a true improvement in the way food is produced.

WHO, together with FAO, has convened several expert consultations on the evaluation of GM foods and provided technical advice for the Codex Alimentarius Commission which was fed into the Codex guidelines on safety assessment of GM foods. WHO will keep paying due attention to the safety of GM foods from the view of public health protection, in close collaboration with FAO and other international bodies.

The Codex Alimentarius Commission (Codex)

The Codex Alimentarius Commission is the joint FAO/WHO intergovernmental body responsible for developing the standards, codes of practice, guidelines and recommendations that constitute the Codex Alimentarius, meaning the international food code. Codes developed principles for the human health risk analysis of GM foods in 2003.

- Principles for the risk analysis of foods derived from modern biotechnology

The premise of these principles sets out a premarket assessment including an evaluation of both direct effects (From the inserted gene) and unintended effects (that may arise as a consequence of insertion of the new gene). Codex developed three guidelines for this:

- Guideline for the conduct of food safety assessment of foods derived from recombinant DNA-plants.

- Guideline for the conduct of food safety assessment of foods produced using recombinants DNA microorganisms.
- Guideline for the conduct of food safety assessment of foods derived from recombinant DNA animals.

Codex principles do not have a binding effect on national legislation but are referred to specifically in several agreements made by the WTO. WTO members are encouraged to harmonize national standards with Codex standards. If trading partners have the same or similar mechanisms for the safety assessment of GM foods, the possibility that one product is approved in one country but reject in another becomes smaller.

Possible Solutions

- Creating clear regulations to what extend GMOs can be created and manufactured.
- Creating clear rules and laws regarding the trade of GMOs
- Creating clear regulations for farmers in under-developed countries in order to protect them for the outcomes of GMO trade

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