

## GM Crop Issues and their Regulation

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### Introduction

There is a perceived benefit to either the producer or the consumer of these meals, GM foods are created and sold. This is intended to result in a product that is either more advantageous, cheaper. Initially, GM seed manufacturers focused on advances that would directly help farmers in order to gain acceptance for their goods among farmers. The major goal of the GM crops now available on the market is to boost crop protection, either by introducing resistance to plant diseases or by increasing herbicide tolerance. In various pockets of the world, there is a public discussion over the marketing and the release of GMOs into the environment. It is most likely in the context of other applications of biotechnology and its effects on human civilizations. The argument's inference varies from nation to country, in spite of the fact that issues existence discussed are every now and then fairly similar. Currently there is no global agreement on such topics like the labelling and traceability of GM foods as a means of addressing consumer preferences. Despite the lack of agreement, the Codex Alimentarius Commission made great strides and developed Codex texts pertinent to the labelling of foods made with modern biotechnology in 2011. This was to ensure consistency between any labelling strategy used by Codex members and already adopted Codex provisions. Employing certain procedures, safety gear and specifically constructed structures to safeguard people, community and environment against unintended discharge of infectious agents, poisons and other biological hazards.

### A. Environmental Safety

#### Effects on Non-target Organisms

It was noted in May 1999 that pollen from corn that was resistant to *Bacillus thuringiensis* (Bt) insects had a deleterious effect on Monarch butterfly larvae. Concerns and

inquiries concerning possible threats to monarch butterflies and maybe other non-target creatures were raised by this issue (Sayre and Seidler,2005).

### **Advance of Insect Resistance**

Insect resistance to Bt was growing as a consequence of the use of Bt crops. Plans for managing insect resistance have been created by the government, private sector and academic institutions. In order to prevent insects from evolving into bug resistant kinds, the plans call for every field of insect-resistant crops to have a nearby refuge of non-GM crops (Shelton,2012).

### **Gene Flow**

Pollen transfer can accidentally cross-pollinate traditional local varieties with GMO plants, contaminating them with GMO DNA and causing farmers to lose their traditional kinds which are of more important source for some specific characters.

### **Weediness Problem**

GM crops will spread like weeds is also concerns. For instance, a GM crop that can tolerate salt may become a dangerous weed if it escapes into marine surroundings. Superweeds are developed the herbicide tolerance gene due to genetic contamination. Due to herbicide tolerance GMO through horizontal gene transfer or in-field cross breeding to allied species.

### **Biodiversity Erosion**

Reduction in genetic diversity happens due to the green revolution's creation and widespread adoption of new crop types. Monocultures also cause genetic degradation.

### **Influence on Soil Biology**

Many plants roots release chemical substances into ground. There are uncertainties because of their altered DNA, transgenic plants may leak different substances than regular plants. It is quite complicated how plants and solid microorganisms interact since the bacteria that present around host plant roots also secrete compounds into soil and disturb the rhizospheric environment.

### **Impossibility of Follow-up**

It is hard to get rid of GMOs when they were introduced into ecosystem and will cause issues. Many of these concerns are the same as those involved in introducing naturally

occurring or conventionally raised animals. Nevertheless, this not indicate that GMOs are secure or advantageous or that they should get less scrutiny.

### **Competitive Nature**

GMOs may have a competitive edge over natural species if they develop more quickly. As a result, they may become invasive, establishes them into new ecosystems and impairment of environment and economy.

### **Selection Pressure on Target and Non target Organisms**

Target and non-target species may be under increased strain to adapt to the introduced changes, much like a geological shift or a natural selection pressure, leading to the evolution of separate resistant populations having negative impact.

### **Genetic Adulteration**

Introduction of GMOs may reproduce with their sexually compatible relatives or the natural type. If the unique characteristic doesn't give the receiver a selection advantage, it can vanish in wild kinds. Wild kinds' tolerance capacities might, however, also grow, altering the ecological communications and behaviour of the native species.

## **B. Effect on Humans and Animals**

### **Toxic Effect**

Any ingredient that go in the food supply is specifically examined for food safety. A transgenic product that may be harmful, must encounter similar security necessities as any biological pesticide.

### **Allergic Effect**

GMO may contaminate the food supply with allergies. A transgenic plant will also produce an allergy if the gene product is a well-known allergen. A Brazil nut albumin, was produced in soybean to increase the methionine concentration. It was discovered that the transgenic soybean extracts caused responses in the serum of individuals which were sensitive to Brazil nuts. Such concern might arise and the proper testing is needed (Lehrer *et al.*, 1996).

## **C. Risk Management**

It is very important aspect if some concern arises and we should have some approaches to nullify or minimizes the effect. Through natural selection, mutation and selection, pest populations exposed to Bt crops regularly from much time period, may

develop resistance to Bt toxins. It is advised to sow enough non-Bt cotton to act as a refuge for Bt susceptibility in seeds in order to prevent the accumulation of resistance. The refuge technique is intended to make sure that, should the need arise, Bt vulnerable insects will be able to breed with Bt resistant insects. Genetic evidences presented suggests that vulnerability predominates over resistance. Therefore, it is likely that the following subsequent generation born from these unions would be Bt vulnerable, preventing the spread of resistance among the populations (Shelton,2012).

#### **D. Biosafety Regulatory Framework in India**

In India, GMOs and their products are subject to regulation under the "Rules for manufacture, use, import, export and storage of hazardous microorganisms/genetically engineered organisms or cells, 1989 under the EPA (1986)" due to potential risks to individuals and environment from their indiscriminate use. In January 2003, India accepted the Biosafety Protocol. The 167 nations in world have agreed and signed the Cartagena Protocol on Biosafety to the Convention on Biological Diversity in March 2014. Cartagena Protocol mandates that all actions using genetically modified organisms, including field tests, be subject to national government regulation and approval. Recombinant DNA Advisory Committee (RDAC) periodically makes suggestions that might be put into practice to sustain the safety standards in the development and use of GMOs and their byproducts. The Department of Biotechnology will house the Review Committee on Genetic Manipulation (RCGM), which will keep an eye on any ongoing research projects or activities involving potentially dangerous microbes, GE organisms and cells and their byproducts. The RCGM was founded under the Department of Biotechnology, Ministry of Science and Technology, keeps an eye on the security of ongoing research projects and activities, such as small-scale field trials, import, export and other things, involving genetically altered organisms. Environmental perspective, GEAC is in charge of approving operations involving extensive use of risky microorganisms and recombinant products in research and industrial production. The project's goal is to improve India's biosafety management system so that individual human health and biodiversity are effectively protected from possible harm from all LMO-related agricultural operations (Shukla *et al.*, 2018).

#### **E. Progression of GM Crops Endorsement in India**

The application to test GM crops is evaluated and decided by RCGM. GEAC reviews applications for field testing after RCGM clearance. If authorized, GEAC evaluates results of the field tests and determines whether to put the GM crop variety in public domain. Small-scale experiments conducted by GEAC are observed and evaluated by MEC, which also reports to GEAC. The crop is approved for commercial distribution by GEAC following a favourable report by MEC. Additionally, ICAR oversees GEAC's seed production and conducts studies. The application is received by the ministry of agriculture, which reviews it against the seed act's provisions before approving the distribution of the crop (Shukla *et al.*, 2018).

### **Conclusion**

To eliminate the harmful influence on plants, animals, humans and eventually the ecosystem, research with complete evidentiary evidence is required. Strong regulatory framework is necessary for appropriate control and to prevent the introduction of dangerous effects. After introduction, if any harmful effects are still present, they should be replenished.

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