Student’s name

Professor’s name

Course

Date

Genetically Modified Food

Modern genetic biotechnology in crops facilitates the movement of genetic components across unconnected species, which is impossible with the traditional approaches to breeding crops. The intentional transfer of genetic elements, in turn, causes scientists to experiment with this approach onto plants (Prakash et al. n.p). As such, Genetically Modified Organisms (GMOs) are bacteria whose genetic components are genetically modified to alter their traits. In essence, the technique of genetic engineering allows scientists to locate individual genes that show precise characteristics and isolate them from the source then transfer them directly into animal cells, crops, bacteria, or viruses. Thereby, these biotechnological opportunities cause greater public and government scrutiny and regulations (Prakash et al. n.p). Environmental use of microorganisms varies widely, entailing DNA technique applications to facilitate advanced genetically produced microorganisms during seed inoculants. However, the introduction of foreign species into the environment could result in unintended environmental adverse effects furthering more distinct ecological responsibilities than wild plants (Prakash et al. n.p). Therefore, the assessment of environmental and health risks requires a cautious approach due to the introduction of recombinant organisms in the natural existence of crops. Genetically Modified (GM) foods should not continue to be integrated into the world’s food market because it can cause health and environmental risks, and due to DNA alterations, there are uncertainties relating to future consequences of plantation and consumption of GM foods on natural species and ecological system.

The impact on the transfer of genes is unknown and unpredictable and thus may result in bio-threat. The genetic modification enables the transfer of genetic components from any microorganism into crops or other organisms causing varying results and unpredictable gene expression alteration. Moreover, the gene sequence and its effects in the donor organism have a well-characterized function in the organism from which it is separated (Kuiper et al. p. 1670). Consequently, the process can cause integration of gene copies and rearrangement or deletion of gene sequences resulting from instability, interference, and lack of function of genes with other gene operations. This can result in potential risks that are either predictable or unpredictable with the release of GMOs in the open surroundings (Tzotzos et al. p.45). As such, each gene can control various characteristics in one organism and have impacts on the overall genome of the host, causing unintended adverse effects. In this case, it is challenging to predict the risks involved with this type of genetic mutation.

World Conservation Union (Tsioumani p. 279) illustrates several environmental risks that can happen due to the application of GMOs in an environment:

* Follow-ups impossibility- The introduction of GMOs into the environment causes the arise of various problems that can be impossible to eradicate. Most of the risks show similarity with the incurred problems from the integration of naturally bred species.
* Horizontal transfer of recombinant genes to other microorganisms through transformation or conjugation can confer a wide-range of characteristics in another organism. Inherently, becoming a source of potential threat to people’s health or disrupt the environment (Heuer & Smalla p. 10). Recent pieces of evidence derived from horizontal gene transfer technology show that transgenic DNA in genetically modified crops and food can spread directly through viruses, bacteria, or into an animal or human cells (Yoshida et al. p. 1128). Besides, horizontal gene transfer migrating from nuclear monocot into the eudicot genome parasite infects numerous grass populations in Africa (Yoshida et al. p. 1128).

Ethical considerations centers fear that the technology is overstepping a moral boundary that allows nature to take its course. Crossing plant breeds appears as a natural process, but the use of genetic modification biotechnology seems significantly unnatural because it crosses the moral limit. As such, this ethical quandary causes the fear of uncertainty based on the outcome of the process, thus there underlies a concern regarding the confidence people have in the application of agricultural biotechnology (Stewart et al. p. 836). The procedure applied to create the GM crop develops controversy over the issues of unintended health and environmental consequences. For instance, in the early 1990s, the introduction of unfamiliar genetic engineered crops resulted in establishing precautionary measures that question whether the issue lies on the GM process or the product containing a new characteristic (Prakash et al. n.p). When assessing the risk, some people may view agricultural biotechnology as a mere gene transfer that is an evolution of the initial crop through breeding methods. However, this appears as an invalid claim because of the substantial difference in alterations that can happen in DNA modifications.

Due to changes in crop DNA, GM crops have the potential to trigger new forms of allergic reactions and gene transfer. Principally, gene transfer from organisms having allergic reactions to non-allergic plants is not encouraged unless the scientist demonstrates that protein products of the transferred gene in non-allergic. GM crops may contain genes from an allergenic organism; thus the World Health Organization (WHO) discourages biotechnology genetic engineering that uses DNA from allergens (Tzotzos et al. p. 50). More so, gene transfer from the GM products to cells in human bodies or the presence of new bacterial in the gastrointestinal tract causes concern if the transferred genetic product negatively affects people’s health. This claim could be relevant if the transfer of antibiotic resistance genes, applied as markers when developing GMOs, occurs. Although there is a minute chance that genes in consumption products can transfer to body cells of bacterial in the gut, some GMO crops comprise genes that cause resistance to various antibiotics. This can cause the resistance to pass on to people affecting their ability to resist or protect themselves against diseases.

Outcrossing is another issue that could arise from the process of genetically modified food. Genes can migrate from GM plants into conventional crops or other species in the uninhabited. Also, there is the risk of mixing plants originating from conventional seeds with GM crops causing an indirect effect on food security and safety. As a result, there exist reports where GM crops approved for animal consumption detected in products for human feed. However, several nations have taken measures to reduce crop mixing requiring the farmers to include separation of fields where GM crops and conventional plants grow (Howse & Horn p. 65). Transgenic plants diverge in their propensity to outcross, and the capability to do this relies on existing sexually compatible wild plants that vary based on location. Therefore, whether or not the flow of gene occurs between transgenic crops and wild plants, the resulting hybrid may have a competitive edge over the wild plant population causing potential disruption of the ecosystem (Tzotzos et al. p. 56). Another potential harm to the environment derived from transgenic traits is the growth of pesticide toxins from Bacillus thuringiensis (Bt) genes that affect non-targeted species and crop pests.

The Food and Agriculture Organization (FAO) studied the potential benefits and risks of GM crops, especially the transgenic herbicide-resistant trait, and found it could result in weed control risks. As such, the repetitive use of one type of herbicide results in a change in weed flora since it needs to evolve biotypes, which are resistant to the herbicides linked to transgenic crops bred to tolerate these herbicides. Furthermore, the flow of gene occurs by spreading genes through pollen and outcrossing from the herbicide-resistant plants to the weed species (Johnson et al. p. 4). Thus, in the absence of the precise herbicide, this trait possession is unlikely to increase the strength of the weeds. Still, the continual use of the herbicide will increase the growth of unwanted plants, further reducing the economic advantages of herbicide resistance (Tzotzos et al. p. 60). Following this argument, the risk of gene transfer is higher in regions of diversification requiring environmental care put in place to ensure native germplasm, which includes weed and wild plant relatives, remains unaffected through the transfer of herbicide-resistant genetic factor.

Another environmental issue resulting from genetic biotechnology is the GM fish. In the fisheries industry, there are increased levels of GMO rates causing great environmental risks as scientists concentrate on genetic pollution, predation, and competition. Substantially, GM fish are likely to cause environmental risk due to their high rates of feeding on other aqua species (Tzotzos et al. p. 62). That is, the bigger the environmental tolerance, which paves the way for them to enter into new territories and displace the existing native populations as well as increase the potential for genetic mixing with other animals (Hill p. 68). Consequently, GM fish may alter the composition of the natural existence of fish species. More so, the alien fish population and genotypes used globally, like tilapia and salmon, demonstrate similar risks. It calls for the need to establish a standard measure when evaluating risks of GMOs agricultural for aquatic species, which are foreign to the local ecosystem. The evaluation can use an ecosystem approach that monitors the spreading of effects once the GM species are exposed in water.

Genetically Modified Organisms (GMOs) opposition fundamentally lies in the fear that these foods may be unsafe for human consumption and could pose a threat to the environment. However, it is essential to recognize that technology and science play a key role in opening up new opportunities in addressing the shortage of food globally. Seemingly, considering the risks presented, it is almost impossible to recognize any benefits derived from transgenic plants often grown today as GM crops used increased levels of chemicals such as glyphosate, which are toxic to people and the environment. Moreover, these chemicals contaminate food, soil quality, water supply, and increased illness vulnerability in crops. Ultimately, it causes an increase in the use of pesticides that further upsets the environment.

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