

Chapter 8

Lifelong Consumption of Plant-Based GM Foods: Is It Safe?

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ABSTRACT

Genetically modified (GM) crops are cultivated in over 30 countries with their products and by-products imported by over 60 countries. This chapter seeks to highlight general concerns and potential lifelong effects of consuming GM plant-based food. The consumption of GM plant-based food is as risky as consuming conventional plant-based food. However, the alien genes in these products may be unstable leading to antinutritional and unintended short-term consequences. Due to the paucity of research, no long-term effects have been attributed to the lifelong consumption of these products. Nonetheless, possible lifelong health and socioeconomic effects may result from outcrossing of genes, increasing antibiotic resistance, development of new diseases, as well as potential effects on the environment and biodiversity. Biotechnology companies need to invest more in interdisciplinary research addressing the potential lifelong effects of these products. Although GM foods are safe for consumption, clarification of current risks and lifelong effects are required.

INTRODUCTION

Plants remain the central food resources for humans and other animals. However, there is increasing pressure on the resources to fulfil this basic need. Population growth, particularly in countries with developing economies, will result in a need to overexploit plant resources to increase food production (Ogwu et al., 2014; Delaney, 2015). Climate change might make economic crops unsuitable for cultivation in their centre of origins and diversity as these areas become increasingly threatened by drought, floods, spread of plant diseases and altered weather patterns (Thompson, 2017). More so, lifestyle changes continue to influence plant use patterns across the globe. For instance, Łuczaj et al. (2012), reported

DOI: 10.4018/978-1-5225-7635-8.ch008

significant changes in the contemporary use of wild food plants in parts of Europe due to the decline of plant knowledge, the disappearance of traditional methods of plant use, reduced availability of plants due to ecosystem changes, land access rights for foragers and intoxication hazards. Hence, even though global agricultural productivity has significantly improved, issues related to food security persist because of multidirectional issues (Lamichhane, 2014).

This chapter seeks to highlight general concerns pertaining to the consumption of genetically modified (GM) plant-based food products. The chapter will address it from an environment and health perspective. Short-term effects of consuming GM plant-based food are easily discernible but not the long-term effects, which may take years, decades or even a lifetime to appear (Murnaghan, 2018). The need to be vigilant and assess the potential risks of such unpredictable occurrences cannot be ignored (Butler and Reichhardt, 1999). GM plants and plant-based products are here to stay regardless of conflicting standpoints. In the sustainable future, which is a long-term global goal, these products might become indispensable. Therefore, so much needs to be done from the different players to make GM products more acceptable. The objective of this chapter is to promote the knowledge of GM plants and plant-based products, their lifelong health and environmental effects as well as to proffer salient recommendations to address pertinent issues. Through these contributions, this chapter will reduce existing fears as well as increase the knowledge, understanding and highlight practical gaps concerning the production and consumption of GM plants and plant-based products.

PUBLIC PERCEPTION OF THE NEEDS AND BENEFITS OF GM PLANTS

The need to achieve food security has led to the intensification of agriculture, which naturally interferes with natural ecological cycles. The agricultural sector contributes to the emission of environmentally dangerous chemicals like ammonia, methane, and nitrates (Zhu et al., 2006). GM plants held under cultivation has long been considered as a sustainable alternative to attain food self-sufficiency and sovereignty albeit controversial. The three pathways by which GM crops contribute to food security include increasing food production and availability, influencing food safety and quality as well as enhancing the economic and social situation of farmers, thereby influencing food accessibility (Qaim and Kouser, 2013). Hunger is a major threat to humanity and it affects an estimated more than 1 billion people many of whom live in developing countries (Delaney, 2015; Hefferon, 2016). It remains our moral obligation to feed the hungry billions. To this end, the GM crop movement has overseen enormous good but also presented significant adverse consequences and prompted controversies (Schlett and Beke, 2015).

GM is the application of gene technology to alter an organism's genome by combining genes from different organisms through recombinant DNA technology to produce a new or modified organism, which may be described as 'GM', 'genetically engineered' or 'transgenic' (Bawa and Anilakumar, 2013). This technology exploits gene variations, expressions and modifications to produce outstanding crops for human benefits. It is distinct from the production of clones, which culminates in genetically identical copies. This technology-based manipulation of living things began with microorganisms and then economic plants but have since expanded to include other organisms from diverse taxa. Insertion of defined foreign genes into the genome of bacteria, moulds, yeast, etc., has resulted in the creation of genetically modified organisms (GMOs). These GMOs or their by-products are primarily used for human food productions as well as in different industrial processes including the production of phar-

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