

Food biotechnology: Innovations and challenges

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1 Introduction

The renowned French actor and playwright, Molière, wrote in the seventeenth century, “*One must eat to live and not live to eat.*” Food biotechnology or rather a food biotechnology is the application of technologies and sciences such as genetic engineering to improve food sources (such as animals, plants, or even microorganisms). One of the main current questions for food biotechnologists is how to obtain a sustainable food model in the context of the growing world population. To feed a population of 9.3 billion people in 2050 and to adapt food production and agriculture to nutritional transitions, the United Nations (UN) has estimated that the world food production will have to increase substantially to 13.5 billion tons from the current production level which is around 8.4 billion tons (United Nations, 2021, <https://population.un.org/wup/>). To overcome this challenge, food production will have to expand significantly by 60% globally and by 100% in developing countries. Moreover, the aging of the population in western countries and the altered eating habits (such as higher meat consumption) implies a complete rethinking of the food chain. Therefore, food sustainability is a major issue tackling the methodologies used to define it (Jones et al., 2016). However, the reduction of the food impact on the environment is difficult to measure. Bryngelsson et al. (2016) have suggested that lower meat consumption could reduce greenhouse gas by 72%. Moreover, the reduction of wastage and food packaging can also be taken into account.

A common vision for sustainable food and agriculture has to be in accordance with legal, social, economic, and environmental factors to assure its sustainability. The general principles of food sustainability have been organized into five key principles by the Food and Agriculture Organization (FAO) including: enhancing the use of agricultural resources, the protection of natural resources by direct actions, the protection of vulnerable rural livelihoods including equity and social well-being, increasing the resilience of people, communities, infrastructure, and ecosystems, and the development of responsible governance mechanisms. Moreover, in response to a tendency toward healthy living, food ingredients with possible health benefits can be considered an opportunity for the food industry even if the new products based on the ingredients have a high failure rate in the commercial market (Sparke and Menrad, 2011). In general, the world population should decrease the consumption of meat (respecting the nutritional recommendations and conserving the traditional cooking),