

## Applications of Food Biotechnology

Farkhanda Haroon<sup>1</sup> and Mobeen Ghazanfar<sup>2\*</sup>

\*Corresponding Author: Ghazanfar M, Department of Zoology, University of Gujrat, Pakistan, Tel: 92 53 3643112, E-mail: mobimubeen56@yahoo.com

Recently many advances in food industry represent great role of food biotechnology. GM plants and animals are used to enhance taste, shelf life, nutrition and quality of food. On the other hand GM yeast and Bacteria are used to produce enzymes for the sake of food industry. These GM foods are produced by using biotechnological techniques specifically genetic engineering. Genetic engineering purpose is to introduce foreign gene of interest in an organism. This foreign gene introduction is for the purpose of enhancement in quality and quantity of food. So these techniques can be used to erase hunger from poor people of third world specially Africa. Besides positive aspects, there are some concerns. We are changing DNA that can be useful, harmful or neutral so it can result in any unexpected results. These results might include health problems. Due to these concerns, some people oppose food biotechnology. Naturalists are also against food biotechnology. According to them, genetic engineering is intervening in nature.

### Role of Food Biotechnology in Food Processing:

#### Fermentation:

Breweries are synthesized through the process of fermentation. Different yeast strains are used to make breweries at commercial level. Genetic engineering has enabled us to make light wine. Yeast is genetically modified through foreign gene encoding glucoamylase. During process of fermentation yeast expresses glucoamylase that convert starch into glucose. Yeast strains used for wine synthesis are capable of malolactic fermentation. Wine synthesis consists of two steps: 1) Primary fermentation results in conversion of glucose into alcohol using yeast. 2) Secondary fermentation uses bacteria and its product is lactic acid and this causes the rise in level of acidity. To overcome this problem different strategies are used which are costly. This problem was solved through insertion of malolactic gene (*Lactobacillus delbrueckii*) in industrial yeast strain. This gene lowers the malate conversion hence lowering acidity level of wine.

#### Enzymes:

Enzymes are used in production and processing of food items specifically produced at industrial level. From second last decade of twentieth century, food processing companies are using enzymes that are produced through genetically modified organisms. These enzymes comprises of proteases and carbohydrases. Genes for these enzymes have been cloned so as to get higher production in less time period. These enzymes are used for making cheese, curd and flavoring food items. Major percentage of these enzymes is used in food industry as in US

Genetically modified food is synthesized using biotechnological tools. Modern Biotechnology is also called as genetic engineering, genetic modification or transgenic technology. In this technology, Nuclear DNA is modified through insertion of gene of interest (gene encoding desired trait). This modified DNA is called as recombinant DNA. When recombinant DNA expresses, it encodes desired product. This technology, when implemented to enhance food qualities or yield is called as food technology. Modern Biotechnology is helpful in enhancing taste, yield, shelf life and nutritive values. This is also useful in food processing (fermentation and enzyme involving processes). So Biotechnology is beneficial in erasing hunger, malnutrition and diseases from developing countries and third world. Modern biotechnology products are commercially reasonable hence it can improve agriculture as well as food industry that will result in raise in income of poor farmers. Following are applications of Modern food biotechnology.

more than 50% of proteases and carbohydrases are used in food industry. These enzymes include rennin and  $\alpha$ -amylase.

Following are some genetically modified enzymes used in food industry:

- Catalase used in mayonnaise production and it removes hydrogen peroxide.
- Chymosin useful in cheese production as it coagulates milk.
- Glucose oxidase is used in baking as it stabilizes the dough.
- $\alpha$ -amylase converts starch into maltose and used in baking for sweetness.
- Protease used for meat tenderization process, baking and dairy products.

#### Conclusion

GM food technology is a one of the advanced technology of era that has potential to solve problems of malnutrition, hunger and poverty. In spite of a lot of advancements, still a large number of people oppose GM food. People should be made aware of potential pros and cons through conduction of seminars. Biotechnology should be taught at high school level to make people more aware. Biotechnology has the potential to solve many health and nutrition related problems of people of developing countries and third world. Institutes like WHO, FDA etc. should cooperate with governments of third world to make biosafety laws and commercialization of GM food. One of the weak areas in the field of food biotechnology is labeling. Proper and positive labeling is required for successful commercialization of GM food. Other weak area is lack of research. When questions are asked about potential risks of biotechnology, many scientists can't answer. Research should

be done to prove or falsify the claims against biotechnology. Debates and seminars should be conducted to raise the trust and confidence of people about GM food.