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Short Communication

Role of Biotechnology in Food Processing

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Abstract

Biotechnology as a science deals with the applicability of various living organisms in development of useful products. The recent times has seen the application in field of flavor change, as food additives and develop a wide range of value added products. The usage of biotechnology mainly aims at producing genetically modified foods and genetically modified starter culture. Biotechnology has brought remarkable changes in field of food processing in production of products with longer storage life and nutritive value. Flavour enhancement and production of vaccines are another important aspects covered under application of biotechnology in food processing.

Keywords: Biotechnology; Food Processing; Enzymes; Genetic Modification

Biotechnology can be defined as the use of living organisms and biological systems which is used to develop useful products. It can also be defined as any technological applications that use biological entity, biological organisms or their derivatives, to make or transform products or practices for certain use. It time and again overlaps with the biomedical engineering and bioengineering fields, depending upon the different applications and tools utilized. The applications and uses of biotechnology in food processing is immense and this includes the following applications such as – its utilization in fermentation of substances and also to enhance properties of the material goods such as the taste, fragrance, shelf-life, texture, quality and nutritional value of that particular food product.

Biotechnology has an important role in the production of enzymes and the use of certain enzymes leads to the required modifications in food. Biotechnology is used in the production of food constituents; flavors, aroma, food additives and an array of other high valued-enhanced products, genetically modified organisms and crops. Food testing and in diagnostics of food ingredients the utilization of advanced technologies of biotechnology is done. Biotechnology helps in increasing food production, provides enhanced harvesting index, nutritional and storage value is also increased, better raw materials production, enriched flavors and the production of food that contains vaccines. The remunerations of biotechnology in reducing the load on food production are immense.

Biotechnology: in enzymes production

The industrial production of enzymes mainly involves the utilization of microorganisms. The microorganisms are cultured in enormous containers after which the desired enzymes are secreted into the medium in which the microorganism was fermented. The enzymes are secreted as a result of microbial activity in form of metabolites. Enzymes that are produced with the above mentioned process is then removed, undergoes purification steps and this purified enzymes is further used in processing of food in the food industry and for various other uses. Purified enzymes do not comprise of cell or any other form of macromolecules such as DNA or RNAs. The efficiency enzymes production from microorganisms have upgraded as a result of genetic technologies. The use of the advanced technologies have augmented the obtainability of the enzymes, reduced the cost of production and upgraded their value. This has resulted in the advantageous effect of increasing efficiency and streamlining methods which employ the use of enzymes as processing aid in the food industry. It is with the help protein engineering techniques, which leads to the generation of unique enzymes which have modification in their structures which in turn confers the

desired and new properties to the enzymes, which includes thermo-stability property, enhanced activity, and the capability of the enzyme molecule to work on a new substrate and even at a higher pH. One of the main approaches presently used for protein engineering process is the use of directed evolution. In this technique creation of large numbers of novel enzymes alternatives is involved and the process used is random genetic mutation and in turn selecting them to recognize the improved alternatives. This process imitates expected evolution processes as it is carried out repetitively.

The use of enzymes is done at industrial level processing of food items as well as enhancing its production. The food processing industries worldwide make use of the enzymes that are produced with the help of organisms that are genetically modified. The enzymes thus produced comprises of carbohydrases and proteases. In order to get greater production in a smaller amount of time, cloning of the genes involved in the enzyme production is done. These enzymes are used for various purposes such as production of cheese, making curd and adding flavors to the food items. In developed nations the major fraction of the enzymes used in food industry is proteases and carbohydrases, which makes more than 50% of the enzymes used [5].

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
α-amylase converts starch into maltose and used in baking for sweetness
Protease used for meat tenderization process, baking and dairy products

Table 1: Common genetically modified enzymes used in food industry.

Biotechnology: in enhancing taste

Biotechnology has permitted scientists to produce fruits and vegetables with better shelf life and taste. Genetically modified crops that have enhanced taste include the following: seedless watermelon, cherries, tomato, eggplant and pepper etc. In this the removal of seeds from the above food crops enhanced the soluble sugar content which in turn enhanced the sweetness [2]. With the use of biotechnology, modification in fermentation pathways is done to enhance the aroma in crops [5]. For many consumer goods the volatile organic chemicals present in the crops such as flavors and aromas are the major factors that determine their acceptance and market value. There is a competition between the flavors that are produced from agricultural origin with the flavors that are produced from micro-organisms. With the application of biotechnology, there are more than 100 commercial aroma chemicals and flavors which are derived through the utilization of conservative bio-engineering technology. The flavors can also be selected through the selection for over-producers [1].

Reasons that decides the success or failure of biotechnology application

Socio-economic factors play the determining role in the adoption as well as use of microbial organisms in food industry. The use, uptake and implementation of advanced biotechnological techniques are generally slower, in circumstances where the price of food item is a principal issue. Demand for improved food has been elicited by the increase in the consumer's standards, educational qualification and new marketing scenarios. There is a drastic shift in the dietary habits and a wider variety of foods that is being consumed in urban centers across a number of developing countries, depending upon the increasing incomes and improved educational standards [3].

Bibliography

1. Berger RG. "Biotechnology of flavours – the next generation". *Biotechnology Letters* 31 (2009): 1651-1659.

2. Falk MC., *et al*. "Food biotechnology: benefits and concerns". *Journal of Nutrition* 132 (2002): 1384-1390.

3. FAO. Current Status and Options for Biotechnologies in food Processing and in Food safety in developing Countries. FAO International Conference, Guadalajara, Mexico. (2010): 349-351.

4. http://www.eufic.org/article/en/rid/modern-biotechnology-foodenzymes/

5. Lawrence R. New applications of biotechnology in the food industry. Biotechnology and the Food Supply: Proceedings of a Symposium (1988).

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