Genetic Engineering of Food

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Introduction. Genetic engineering of food is the science which involves deliberate modification of the genetic material of plants or animals. It is an old agricultural practice carried on by farmers since early historical times, but recently it has been improved by technology.

Materials and methods. Genetic engineering of food has been with man since time immemorial. Forms of genetic engineering have been practiced by resourceful farmers by breeding plants and animals to emphasize certain attributes, by gathering and planting the seeds of fatter grains, by selecting meatier and hardier animals for breeding, and by cross-fertilizing different species of plants to create new varieties that exhibit the most desirable characteristics of the parent plants.

Potential risks of genetically modified foods:

The critics of genetic engineering of foods have concerns, not only for safety, allergenicity, toxicity, carcinogenicity, and altered nutritional quality of foods, but also for the environment. They fear that gene transfer techniques can result in some mistakes as these methods, like other human efforts, are far from foolproof.

1.1. Alteration in nutritional quality of foods

Foreign genes might alter nutritional value of foods in unpredictable ways by decreasing levels of some nutrients while increasing levels of others.

1.2 Antibiotic resistance

In genetic engineering, marker genes bearing antibiotic resistance are often used in the target organism. There is a concern that deliberately breeding antibiotic resistance into widely consumed crops may have unintended consequences for the environment as well as for humans and animals consuming the crops

1.3 Potential toxicity

Genetic modification could inadvertently enhance natural plant toxins by switching on a gene that has both the desired effect and capacity to pump out a poison. Genes for some natural toxins such as protease inhibitors in legumes, cyanogens in cassava and lima beans, goitrogens in canola species, and pressor amines in bananas and plantains, may be turned on and lead to an increase in levels of these toxins which can pose a hazard to the consumers of these crops.

Results. Supporters of the genetic engineering of foods cite increased year-round food availability, improved nutritional quality, and extended shelf-life as some of the reasons why they encourage the new science which will benefit consumers, farmers, and the environment.

Moreover, they believe that it will lead to a general improvement in agriculture and food, and will provide healthier, cheaper, more stable, nutritious, better tasting, and safer foods.

1.1 Improvement in fruit and vegetable shelf-life and organoleptic quality

GM has led to improved shelf-life and organoleptic quality in certain crops. The Flavr Savr tomato is the first genetically engineered crop and whole food approved by the FDA .Flavr Savr tomato was produced by Calgene Corporation.

1.2. Improved nutritional quality and health benefits

Genetically modified crops have tailored and added value features such as nutrients and health benefits. Bovine growth hormone enhances milk production in cows. Pigs can also be treated with a hormone called recombinant porcine somatotropin a growth hormone that increases meat production in pigs, and reduces the amount of fat thereby producing low-fat pork. Soya bean could also be bio-engineered to form a more nutritious and flavorful crop.

1.3. Improved protein quality through GM

Protein quality of foods and feeds have been improved by genetic engineering and there is less risk of allergies from GM foods than in conventional foods already in the market or in plants produced by classical breeding methods which introduce potential allergens into the product.

1.4. Improvement in quantity and quality of meat, milk, and livestock production

Genetic engineering, especially animal cloning, could lead to large-scale production of livestock to meet the high demand for meat and protein foods. Countries with the technology for cloning will be able to produce excess livestock which can be exported cheaply to countries with scarce meat and milk supply.

Conclusions. Adequate regulation, constant monitoring and research are essential to avoid possible harmful effects from GM food technology. The nutritional and health benefits of genetic engineering are so many and will be useful to the growing world population which is currently estimated at six billion.

References

1. http://www.cfsan.fda.gov/~lrd/biotechm.html#reg.
2. http://www.srtp.org.uk/whatisrt.shtml.
3. http://reason.com/bi/bi-gmf.shtml.

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