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Genetically engineered foods-advantages and controversy

CHEMISTRY

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ABSTRACT

Genetic engineering is being used nowadays for the food and fiber production in support of human needs. However, it is increasing matter of concern about the use of genetic engineering for plant improvement, particularly about possible deleterious effects on human health and about the impacts of the widespread deployment of genetically modified plants in the environment.

Genetic engineering is the science in which the characteristics of an organism are deliberately modified by the manipulation of the genetic material, by manipulating the DNA in various ways and transferring it from one organism to another. Traits of almost any organism can be introduced to a plant, bacteria, virus, or animal. Such transgenic organisms are now programmed to manufacture in bulk, various pharmaceutical products including drugs, vaccines (Brown, 1996; Campbell,1996) enzymes, monoclonal antibodies, nutrients and hormones .

Plant biotechnology specifically involves the use of microbes or biological substances to perform specific processes in plants for the benefit of mankind. This is done by creating species in which plant metabolism is tailored to provide raw material with respect to quality, functionality,and availability. The genetically engineered plants are named as bio-engineered plants, genetically modified organisms (GMOs), genetically modified (GM) crops, or biotech plants (Liu, 1999; Wilkinson, 1997).

Advantages of GM foods;The world population is predicted to double in the next 50 years, it is going to be a major challenge to ensure an adequate food supply for this booming population in coming years. GM foods can meet this need of food in a number of ways:

Developing Pest resistance Crops ; every person avoids food that has been treated with pesticides .Growing GM foods such as B.T corn can help eliminate the application of chemical pesticides and can make the crop economical viable.

Developing Herbicide tolerance crops; large quantities of different herbicides are being used to destroy weeds, it is a time-consuming and expensive process, genetically-engineered plants helps in preventing environmental damage by reducing the amount of herbicides needed. For example nowadays genetically modified soybeans require one application of weed-killer instead of multiple applications, reducing production cost and limiting the dangers of agricultural waste run-off.

Developing Disease resistance crops; viruses, fungi and bacteria cause plant diseases. Genetically-engineered plants are resistance to these diseases.

Developing Cold tolerance plants; frost destroys sensitive seedlings, after introducing an antifreeze gene from cold water fish into plants such as tobacco and potato plants are able to tolerate cold temperatures

Developing Drought tolerance/salinity tolerance plants; creating plants that can withstand long periods of drought or high salt content in soil and groundwater can help people to grow crops in formerly inhospitable.

Developing Pharmaceuticals Medicines and vaccines; Researches are going on to develop edible vaccines in tomatoes and potatoes, these vaccines will be much easier to ship, store and administer than traditional injectable vaccines.

Developing crops which are highly nutritious; rice does not contain adequate amounts of all necessary nutrients to prevent malnutrition. By consuming Genetically engineered rice which contains additional vitamins and minerals nutrient deficiencies could be alleviated. For example researchers have developed a strain of "golden" rice containing an unusually high content of beta-carotene (vitamin A)

Controversy regarding GM food; The genetic modification of foods has been surrounded by controversy since the early 1990s. The cloning of Dolly the sheep in Scotland (Wilmut et al., 1997) sparked several controversial debates, (Annas, 1997; Krauthammer, 1997). There are some apprehensions that fast pace of research in genetic engineering may some day lead to cloning of humans which is strongly opposed (Masci, 1997; Woodard and Underwood, 1997).

Some critics totally oppose any form of genetic engineering in plants or animals. Recent food controversies include: (1) the cloning of farm animals (Dyer, 1996; Wilmut et al., 1997); (2) 'mad cow disease' in Great Britain in the early 1990s (Patterson and Painter, 1999); (3) 'terminator seed' technology (Koch, 1998); and (4) the decision by the FDA to classify irradiated and GM foods as organic foods (Cummins,1997)Applying GM techniques to human food production may have several adverse consequences. For the critics, safety, ethical, religious, and environmental concerns far outweigh the interest in improved food quality, increased food production, and improved agriculture brought about by GM techniques.

Critics believe that genetic engineering of foods touches on several issues such as:the right of consumers to know what is in the food they buy, what are the standards set up by different countries,the impact of GM crops on biological diversity, the possible negative impact of GM crops on the security of food supply,the possible spread of antibiotic resistance to man , the possible development of resistance by insects to GM plant toxins and the ecological impacts. A study in 1999 claimed that rats' growth was stunted when GM potatoes were fed to the animals (Ewen and Pusztai, 1999; Rhodes, 1999).

Supporters of genetic engineering of foods think that, the technology can be applied to the large-scale production of food and drugs as it lead to faster growing, disease resistant, weather resistant, and pest-resistant crops, herbicide tolerant crops, as well as tastier, safer, more convenient, more nutritious, longer-lasting and health-enhancing foods (BIO, 1998; Day, 1996). Also they are of the view that GM foods can potentially solve critical problems of world agriculture, health, and ecology.

REFERENCE

Annas J. Cloning: Crossing nature's boundaries. The Boston Sunday Globe, March 2, 1997, D1, D2. BIO. Member survey. Biotechnology Industry Organization. 1998. Web site: www.BIO.org. Cummins R. US plans to define bio-engineered foods as 'organic.' Earth Island J 1997;12(4):18. Day PR. Genetic modification of plants: significant issues and huddles to success. Genetic engineering-opportunities and challenges in infant nutrition. Amer J Clin Nutr 1996 April;63(4):6315. Dyer O. Sheep cloned by nuclear transfer. Br Med J 1996;312(7032):658. Ewen SW, Pusztai A. Effect of diets containing genetically modified potatoes expressing Galanthus nivalis lectin on rat small intestine. Lancet 1999 Oct 16;354(9187):1353–4. Koch K. Food safety battle: organic vs. biotech. Congressional Quarterly Researcher 1998;9(33):761–84. Krauthammer C. A special report on cloning. Time 1997 March 10;149(10):60. Masci D. The cloning controversy: Should the US ban human cloning research? CQ Researcher 1997;7(18):409–32. Patterson WJ, Painter MJ. Bovine spongiform encephalopathy (BSE) and new variant Creutzfeldt-Jakob Disease:an overview. Commun Dis Public Health 1999;2(1):5–13. Rhodes JM. Genetically modified foods and the Pusztai affair. BMJ 1999 May 8;318(7193):1284. Wilmut I, Schnleke AE, McWhir J, Kind AJ,Campbell KHS. Viable offspring derived from fetal and adult mammalian cells.Nature 1997Feb 27;385(6619):810-3. Woodard KL, Underwood A. Today the sheep,. . . .tomorrow the shepherd? Before scientists get there, ethicists want some hard questions asked and answered. Newsweek 1997;129(10):60.