Emerging trends in genetic engineering.

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ABSTRACT

Applications of genetic engineering in agriculture and the food industry could increase world food supplies, reduce environmental problems associated with food production, and enhance the nutritional values of certain foods. Recombinant DNA techniques, which manipulate cells' deoxyribonucleic acid (DNA), developed in the 1970's enable researchers rapidly to make specific, predetermined genetic changes. Because the technology also allows for the transfer of genes across species and kingdom barriers, an infinite number of novel genetic combinations are possible. By the mid-1990's, more than one thousand genetically modified crop plants were approved for field trials. The goals for altering food crop plants by genetic engineering fall into three main categories: to create plants that can adapt to specific environmental conditions to make better use of agricultural land, increase yields, or reduce losses; to increase nutritional value or flavor; and to alter harvesting, transport, storage, or processing properties for the food industry. Many genetically modified crops are sources of ingredients for processed foods and animal feed. Genetically modified microbes are used for the production of food additives such as amino acid supplements, sweeteners, flavors, vitamins, and thickening agents. In some cases, these substances had to be obtained from slaughtered animals. Altered organisms are also used for improving fermentation processes in the food industry. The transfer of genetic material to wild relatives (outcrossing, or "genetic pollution") might also lead to the development of new plant diseases. As with any new technology, there may be other unpredictable environmental consequences.