Are foods derived from GM crops safe?

SAFE
FOR HUMAN CONSUMPTION

Pocket K
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In 1994, the first genetically modified (GM) food, a tomato with a delayed ripening trait, was grown and consumed in a developed country. Since then a growing number of foods derived from GM crops have been introduced into the market and safely eaten in countries all over the world. The introduction of these novel foods into our diets has raised legitimate concerns about their safety.

GM crops are developed using the tools of modern biotechnology and it is because of this that many have questioned whether these foods are safe as those that have been developed using more traditional agricultural methods. What is the difference between conventional plant breeding and plant biotechnology? Their purpose is one and the same: to produce superior plant varieties with improved characteristics that make them better to grow or more desirable to eat. The difference lies in how this is achieved.

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"Traditional cross (plant) breeding requires the mixing of thousands of genes between two plants in the hope of getting the desired trait. With modern biotechnology, you can choose the specific characteristic you want and add that single feature to a seed. The difference between these two techniques is dramatic. Imagine trying to add one word of Spanish to an English dictionary. With traditional plant breeding, you'd have to mix both dictionaries together and hope that the word you wanted ended up in the English version. Of course, lots of other words you weren't interested in would have been added at the same time. Plant biotechnology allows you to choose and move the single characteristic you want - it's streamlined, efficient, and produces superior results."

– American Dietetic Association Biotechnology Resource Kit, 2000

The techniques used in modern plant biotechnology provide plant breeders with precise tools that permit them to introduce desirable characteristics into a plant. Further, they do so without having unwanted or extra traits that occur with traditional plant breeding. Because of the control that's afforded with plant biotechnology, scientists can examine introduced traits in great detail. ❑

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▼ Papayas resistant to Papaya Ringspot Virus are now available.

"quotes on the issue of food safety"

"For human health, to date there is no evidence currently commercialised GM crop varieties or foods made from them, are toxic, allergenic or nutritionally deleterious... On balance, we conclude that the risks to human health are very low for GM crops currently on the market." (GM Science Review Panel, UK*, July 2003)

"The potential direct health effects of GM foods are generally comparable to the known risks associated with conventional foods, and include, for example, the potential for allergenicity and toxicity of components present, and the nutritional quality and microbiological safety of the food." (World Health Organization, 2005)

"The addition of new or different genes into an organism by recombinant DNA techniques does not inherently pose new or heightened risks relative to the modification of organisms by more traditional methods, and the relative safety of marketed products is further ensured by current regulations intended to safeguard the food supply.... No food products, whether produced with recombinant DNA techniques or with more traditional methods, are totally without risk. The risks posed by foods are a function of the biological characteristics of those foods and the specific genes that have been used, not of the processes employed in their development." (Scientists in Support of Agricultural Biotechnology, in http://www.agbioworld.org/declaration/petition/petition.php)

** Full Report is available at http://www.gmsciencedebate.org.uk*

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Foods derived from GM crops have undergone more testing than any other food in history. Before entering the marketplace, they are assessed consistent with guidelines issued by several international scientific agencies such as the World Health Organization, the Food and Agriculture Organization, and the Organization for Economic Cooperation and Development. These guidelines are the following:

- GM food products should be regulated in the same way as foods produced by other methods. The risks associated with foods derived from biotechnology are of the same nature as those for conventional foods.
- These products will be judged on their individual safety, allergenicity, toxicity, and nutrition rather than the methods or techniques used to produce them.
- Any new ingredient added to food through biotechnology will be subject to pre-market approval in the same way a new food additive, such as a preservative or food color, must be approved before it reaches the marketplace. ❑

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▲ GM corn products have been available in the market for a few years now.

How are foods derived from GM crops assessed for food safety?

Before any GM food can enter the market, it has to be exhaustively tested by the developer and independently evaluated for safety by scientists or experts in nutrition, toxicology, allergenicity, and other aspects of food science. These food safety assessments are based on guidelines issued by competent regulatory agencies of each country and include: a description of the food product; detailed information about its proposed use; and molecular, biochemical, toxicological, nutritional, and allergenicity data. Typical questions that must be addressed are:

- Does the GM food have a traditional counterpart that has a history of safe use?
- Has the concentration of any naturally occurring toxins or allergens in the food changed?
- Have the levels of key nutrients changed?
- Do new substances in the GM food have a history of safe use?
- Has the food's digestibility been affected?
- Has the food been produced using accepted, established procedures?

Even after these and other questions about the GM food are answered, there are still more steps in the approval process before the GM food can be commercialized. In fact, GM foods are the most studied food products ever produced.

What are the issues?

Allergens

One of the public's biggest concerns related to GM foods is that an allergen (a protein that causes an allergic reaction) could be accidentally introduced into a food product. Fortunately, scientists know a lot about which foods trigger allergic reactions in adults and children. Ninety percent of all food allergies are associated with only eight foods or food groups – shellfish, eggs, fish, milk, peanuts, soybeans, tree nuts, and wheat. These, and many other food allergens, are well characterized and so it is extremely unlikely that they would ever be introduced into a GM food.

Even so, allergenicity screening is a very important part of safety testing before a crop can enter into the food market. A variety of tests and questions must be considered to determine whether the food poses any increased risk of allergenicity.

Allergens have shared properties: they remain stable during digestion; they tend to be stable during food processing; and they are usually abundant in foods. None of the proteins that have been introduced into commercially available GM foods have any of these properties. They are from sources with no history or allergenicity or toxicity; they do not resemble known toxins or allergens; and they have functions which are well understood. They are also present at very low levels in the GM food; they are rapidly degraded in the stomach; and they have been confirmed as safe in animal feeding studies.

As for the genes themselves, the material (DNA) that encodes the genetic information is present in all foods, and its ingestion is not associated with any ill effects. There is no inherent risk in consuming DNA. In fact, we take in DNA every time we eat as it is present in all plant and animal material. ❑

Antibiotic Resistance

Some GM crops contain genes for a trait called antibiotic resistance. Scientists use this trait as a marker to identify cells into which the desired gene has been successfully introduced. Concerns have been raised that these marker genes could move from GM crops to microorganisms that normally reside in a person's gut and lead to an increase in antibiotic resistance. There have been numerous scientific reviews and experimental studies of this issue and they have come to the following conclusions:

- The likelihood of antibiotic resistance genes moving from GM crops to any other organisms is extremely remote; and
- Even in the unlikely event that an antibiotic resistance gene is transferred to another organism, the impact of this transfer would be negligible, as the markers used in GM crops have limited clinical or veterinary use.

Nevertheless, in response to public concerns, scientists have been advised to avoid using antibiotic resistance genes in GM plants. Alternative marker strategies are being evaluated and developed. ❑

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◀ All assessed GM foods are as safe as their traditional counterparts.