

## EDITORIAL

### TRANSGENICS: ARE THESE FOODS BENEFICIAL OR HARMFUL?

*The need to increase the quantity of available foods due to the huge increase in the world's population and demands to stimulate food production in countries with climates that prevent the availability of crops throughout the year or, failing this, to be able to provide the inhabitants of these countries with foods in the required quantities and conditions, are the main reasons why biotechnology is playing a major role in the achievement of these aims.*

*The requirements are to grow crops whose production is not seasonal, that is, crops that can be harvested throughout the year and that are also resistant to parasites, pesticides or herbicides without loss of nutritional or organoleptic properties (appearance, taste). A third condition is that the new forms of cultivation or the techniques used on seeds should not represent a risk to the consumer, including the animals at which some of these foods are directed.*

*The creation of areas reproducing optimal conditions of temperature and humidity for each plant, as well as improved irrigation, have achieved the first aim: the availability of some vegetables, mainly fruits, throughout the year. Previously, hybrid foods were obtained through grafts or cross breeding between various plants with no apparent harm to consumers. The same does not seem to be true of other techniques such as chemical mutagenesis, irradiation or treatment with hormones, ethylene or salicylic acid, which are potential causes of toxic and allergic reactions<sup>1-3</sup>.*

*The most recent technique, currently under development, is genetic modification of plants to obtain transgenic foods. The technology is based on the insertion of specific genetic material using recombinant DNA. The genes are either from other plants or from certain viruses. The premises underlying belief in the safety of these foods are that they are nutritionally substantially equivalent to their unmodified counterparts, do not modify absorption, cause no genetic alterations in consumers in the long term, do not produce toxic products and, of interest to us, that they do not produce new allergens<sup>1</sup>.*

*The first alarm was raised in 1996 when Nordlee et al<sup>4</sup> demonstrated that modification of soybeans destined for animal consumption through a gene from Brazil-nut (rich in methionine, an essential amino acid for animal growth), also transmitted a major Brazil-nut allergen (2S albumin: Ber e 1). This study was performed in nine patients with allergy to Brazil-nut, but not to soybean, and used in vitro tests (RAST, electrophoresis, im-*

*munoblotting) and skin prick testing. Consequently, in future genetic manipulation of foods, the possibility of transferring allergens from one plant to another, which could increase the list of "hidden" allergens<sup>5</sup>, should be borne in mind.*

*Equally, the possibility of producing new allergens as a result of changes in the expression of receptor genes in contact with the transferred gene has not been ruled out<sup>6</sup>.*

*Aware of these risks, those working in the international organizations, FAO/WHO, have drawn up a basic document to evaluate the allergenicity of these foods. The following recommendations had previously been established: a) the genes of highly allergenic foods should not be transferred unless the transferred gene does not codify for the allergen; b) foods containing a transferred gene should not be commercialized, unless clearly stated on the label; c) the responsible bodies should inspect genetically modified foods that supposedly contain a new allergen, even though no sensitized individuals have been identified. To evaluate allergenicity, a decision-tree has been proposed for use by food manufacturers<sup>7</sup>.*

*Not only are the risks of consuming these foods feared, so too is the possibility of reactions being produced through contact or inhalation of food particles in workers handling these products as well as through inhalation of pollen from genetically modified plants. Consequently, at least crops in the experimental phase should be appropriately isolated, which would also avoid pollination of unmodified plants. Staff working in plantations, especially those already suffering from an allergic disease, should also adopt measures to prevent inhalation or contact with pollen.*

*Although the risk of these new foods causing allergic reactions still seems slight, all possible precautions should be taken, especially by individuals sensitized to foods or other allergens. Preventive measures should also be taken in small children with an atopic disposition, because of the increasing use of soy, one of the most frequently genetically modified substances, in children's foods. To avoid serious accidents, legislation obliging manufacturers to include each and every component of a food product on the label is essential<sup>8</sup>. In the case of genetic modification, phrases such as "genetically modified" or "this product has been genetically modified to improve its texture", among other phrases provided in an FDA document<sup>9</sup>; are not enough; labels should clearly specify the origin of genetic material, especially when it comes from other foods.*

**F. Muñoz-López**

---

## REFERENCES

1. The Royal Society. Genetically modified plants for food use and human health. An update. Policy document 4/02. February 2002 ([www.royalsoc.ac.uk](http://www.royalsoc.ac.uk)).

2. Armentia A, Callejo A, Díaz-Perales A, Martín-Gil FJ, Salcedo G. Enhancement of tomato allergenicity after treatment with plant hormones. *Allergol et Immunopathol* 2003;31:44-6.
3. Hänninen A-R, Mikkola JH, Kalkkinen N, Turjanmaa K, Ylitalo L, Reünala T, et al. Increased allergen production in turnip (*Brassica rapa*) by treatment activating defense mechanisms. *J Allergy Clin Immunol* 1999;104:194-201.
4. Nordlee JA, Taylor SL, Townsend JA, Thomas LA, Bush RK. Identification of a Brazil-nut allergen in transgenic soybeans. *N Engl J Med* 1996;334:688-92.
5. Steinman HA. "Hidden" allergens in foods. *J Allergy Clin Immunol* 1996;98:241-50.
6. Lack G. Clinical risk assessment of GM foods. *Toxicol Lett* 2002;127:337-40.
7. FAO/WHO Expert Consultation on Allergenicity of Foods Derived from Biotechnology. Evaluation of allergenicity of genetically modified foods. Rome, Italy. January 2001.
8. Wood RA. Food manufacturing and the allergic consumer: accidents waiting to happen. *J Allergy Clin Immunol* 2002;109:920-2.
9. U.S. Food and Drug Administration. Center for Food Safety and Applied Nutrition. Guidance for Industry. Voluntary labelling indicating whether foods have or have not been developed using bioengineering. Draft guidance. January 2001.