

Royal Society submission to the Government's GM Science Review

Genetically modified plants for food use and human health

The genetic modification of plants raises important issues for science and the public, and the Royal Society encourages debate, informed by sound science, about the potential benefits and risks of this technology. We have been offering policy-makers advice on GM plants during the development of this branch of science and we have published a number of reports during the last five years. Further details and the latest information of the Society's work can be found at <http://www.royalsoc.ac.uk/gmplants/>.

The use of genetically modified (GM) plants has the potential to offer benefits in agricultural practice, food quality, nutrition and health. In the Royal Society's report 'Genetically modified plants for food use and human health – an update', published in February 2002, we found that there was no reason to doubt the safety of foods made from GM ingredients that were available then, nor to believe that genetic modification makes foods inherently less safe than their conventional counterparts.

More specifically in this report we considered the possible effects of GM food on human nutrition; the possible allergic responses to GM foods; the potential effects on human health resulting from the use of viral DNA in plants; and the fate of GM plant DNA in the digestive system. Having reviewed the scientific evidence we concluded:-

- that although one potential application of GM technology is to improve the nutritional quality of crops, it is possible that GM technology could lead to unpredicted harmful changes in the nutritional status of foods. However such alterations might also occur in the course of conventional breeding.
- there is at present no evidence that GM foods cause allergic reactions. The allergenic risks posed by GM plants are in principle no greater than those posed by conventionally derived crops or by plants introduced from other areas of the world.
- that the risks to human health associated with the use of specific viral DNA sequences (e.g. the promoter derived from the cauliflower mosaic plant virus) in GM plants are negligible.
- that the very long history of DNA consumption from a wide variety of sources poses no significant risk to human health, and that additional ingestion of GM DNA has no effect.

In addition, the Science Review Panel has highlighted a number of key issues for contributors to respond to, including

'New techniques for detecting very fine differences between transgenic and the parental or recipient plants are becoming available (e.g. proteomics). These could be very valuable in detecting unintentional harmful interactions. However, it does pose the question how would such data be used in a safety assessment?'

We considered this issue in our 2002 study and found that in the future, safety assessments might make use of new profiling techniques such as micro-array technology for detailed studies of mRNA expression, quantitative two-dimensional gel electrophoresis and mass spectrometry for protein analysis, and metabolomic analyses to look at changes in all metabolites and metabolic intermediates. Application of such techniques to characterize differences between the GM crop and the appropriate comparator should help provide a rigorous scientific basis for hazard identification. However, much development work remains to be done, in particular to determine the utility of this approach in relation to the wide natural variation in composition between crops grown in different environments. Long-term research is required before these techniques can be applied to safety assessments of GM and non-GM foods. Therefore we recommended that research should be undertaken to develop such technology and to define the 'normal' compositions of conventional plants. We welcomed the funding initiatives already put in place by the European Union Framework V programme and the UK's Food Standards Agency (FSA). We also recommended that the biotechnology industry should collaborate with academia and regulators to develop techniques and share reference data. This will help ensure that the new techniques are wisely applied and that agreement is reached on interpretation of results.

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Reference : Genetically modified plants for food use and human health – an update, The Royal Society, February 2002
<http://www.royalsoc.ac.uk/templates/statements/StatementDetails.cfm?statementid=165>