

# **GM Science Review**

## **Second Report**

**An open review of the science relevant to GM crops and food  
based on interests and concerns of the public**

**Prepared by the GM Science Review Panel**

**(January 2004)**

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**Foreword by Sir David King,  
Government Chief Scientific Adviser**

The GM Science Review was commissioned as part of the wider GM public dialogue by Mrs Margaret Beckett, the Secretary of State for the Environment, Food and Rural Affairs; with the agreement of the responsible Ministers in the devolved administrations. This report which supplements our earlier publication in July last year has, like the First Report, now been formally submitted to Mrs Margaret Beckett MP, Mr Allan Wilson MSP at the Scottish Executive, Mr Carwyn Jones AM at the National Assembly for Wales, and Mrs Angela Smith, Parliamentary Under Secretary of State at the Northern Ireland Office, to help inform government's decision making on GM crops and food.

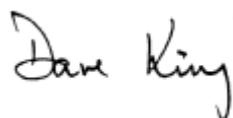
The Review has continued in its endeavour of taking an open look at the science relevant to GM crops and food, and to do so in a way that recognises the interests and concerns of the public as well as the science community.

The Science Review Panel's First Report was published in July 2003 and attracted wide public and media interest, both in the UK and abroad, with over 20,000 copies downloaded from the Review website. The Panel invited comments on the report and we entered the second phase of our Review. During this second phase, the Panel met on four occasions to discuss comments received on our First Report and the extent to which these altered our conclusions. We also examined the report of the GM Public Debate 'GM Nation?', to consider whether there were any further issues we should address and we also looked to see if there had been significant developments in GM science over the summer that we should report on. In particular, we considered the results of the UK Farm-Scale Evaluations of GM crops.

Once more, I extend my thanks to the Panel members for the time they have given and the cooperative way in which they have worked on this Second Report. As with the First Report, we have respected differences in views and recognised that that Panel members do not individually cover all the areas of expertise. On this basis, I am pleased to say that as with the First Report, the Panel has taken collective ownership of the Second Report.

On behalf of the Panel, I would also like to thank all those who submitted comments. We have sought to take account of your submissions. And I know that the Panel would wish to acknowledge the dedication of the Secretariat, in bringing this Second Report to print.

Finally, the publication of this Second Report marks the end of the GM Science Review and its Panel. Science moves on and the scientific debate over GM issues will continue. Scientific GM advisory committees such as the Advisory Committee on Releases to the Environment (ACRE), the Advisory Committee on Novel Food and Processes (ACNFP) and the Advisory Committee on Animal Feedingstuffs (ACAF) will continue in their task of advising the UK government on the safety of GM food and feed and impacts on the environment and we hope this Review facilitates their work. We also hope that we have succeeded at least in part, in our ambition of engaging in scientific issues of public interest to raise the level of discussion about GM matters in the UK. In conclusion, I note that the GM Science review process, taken in the context of the UK Government's wider GM Dialogue, has been generally regarded as a very positive and useful exercise. I believe this initiative provides important lessons and a positive model for any such exercise in future.



22 January 2004

## Members of the GM Science Review Panel

Professor Sir David King FRS <b>(Chairman)</b>	Chief Scientific Advisor, HM Government
Professor Howard Dalton FRS <b>(Deputy Chairman)</b>	Chief Scientific Advisor, Department Environment, Food and Rural Affairs
Dr Michael Antoniou*	Reader in Molecular Genetics, GKT School of Medicine, King's College London
Dr Mark Avery	Director of Conservation, Royal Society Protection of Birds, Bedfordshire
Professor Janet Bainbridge OBE	Director Science and Technology, University of Teesside; Chair of the Advisory Committee on Novel Foods and Processes
Dr Chitra Bharucha	Consultant Haematologist; Chair of Advisory Committee on Animal Feedingstuffs
Professor Dianna Bowles OBE	Director of CNAP, Department of Biology, University of York
Dr Simon Bright	Syngenta, Jealott's Hill International Research Centre, Berkshire
Dr Andrew Cockburn	Monsanto, Trumpington, Cambridge
Professor Mick Crawley FRS	Imperial College, Silwood Park, Berkshire
Professor Philip Dale	John Innes Centre, Norwich
Professor Mike Gale FRS	Deputy Director, John Innes Centre, Norwich
Professor Mike Gasson	Food Research Institute, Norwich; Chair of the Advisory Committee on Novel Foods and Processes
Professor Alan Gray OBE	NERC Centre for Ecology and Hydrology
Professor John Gray	Department of Plant Science, University of Cambridge
Professor Pat Heslop-Harrison	Department of Biology, University of Leicester
Ms Julie Hill MBE	Programme Adviser, Green Alliance; Deputy Chair of the Agriculture and Environment Biotechnology Commission
Dr Brian Johnson	Head of Agricultural Technologies, English Nature, Somerset
Professor Chris Leaver FRS	Head, Department of Plant Sciences, University of Oxford
Dr Bruce Pearce*	Deputy Research Director and Head of Operations, Elm Farm Research Centre
Professor Jules Pretty	Director of Centre for Environment and Society, University of Essex
Revd. Professor Michael Reiss	Institute of Education, University of London
Professor Bertus Rima MRIA	Medical and Biological Centre, Queens University, Belfast
Professor Bernard Silverman FRS	Master, St Peter's College, Oxford
Dr Andrew Stirling	Science Policy Research Unit, University of Sussex
Professor William Sutherland	School of Biology Science, University of East Anglia, Norwich
Professor Michael Wilson FRSE	Chief Executive, Horticulture Research International
Professor Peter Young	Professor of Molecular Ecology, Department of Biology, University of York

### The Secretariat

Dr Adrian Butt <b>(Secretary)</b>	OST/DEFRA
Mr Matthew Billson	OST
Mr Richard Pitts	OST
Mr David Trew	OST

\* New members who joined the Panel in the Autumn of 2003.

# EXECUTIVE SUMMARY

The GM Science Review Panel's First Report was published on 21 July 2003 and attracted wide public and media interest, with over 20,000 copies downloaded from the Review website. The second phase of the GM Science Review had three main purposes:

- to consider the issues raised in the Public Debate held in the summer of 2003 in the context of our First Report;
- to address new scientific developments that had taken place since the publication of our First Report, including the publication of the GM Herbicide-Tolerant Crop Farm-Scale Evaluations (FSEs) on 16 October 2003; and
- to consider reactions to the First Report received by letter and through the Review website and to consider to what extent these altered our conclusions.

## **Section 1: The significance of the Public Debate for the Science Review**

We reviewed the Public Debate Report: 'GM Nation?', and consider that our First Report covered those scientific issues raised by the public that were relevant to our remit. See Section 1.2 for an analysis of points raised and for relevant references to the First Report. The GM Science Review Panel and the Public Debate Steering Board were assisted by the foundation discussion workshops<sup>1</sup>. These helped to frame the issues both for the Public Debate and for our Review. We noted that some of the concerns expressed in the course of the Public Debate coincided with scientific uncertainties already identified and discussed in our First Report. Far from being 'anti-science', there was a strong theme in the Public Debate for further research to be done.

## **Section 2: New published research**

Any review can only be based on the state of knowledge and understanding at the time it is carried out, and new research results have continued to emerge since the First Report was published. In addition to our consideration of the FSEs in Section 3, we reviewed a number of other important recent scientific papers, concentrating on their possible impact on our conclusions. None of this newly published research significantly altered our earlier conclusions.

## **Section 3: The GM Crop Farm-Scale Evaluations**

The FSE results were published after our First Report, and we considered them in detail in the second phase of our work. Our conclusions were submitted to the Advisory Committee on

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<sup>1</sup> Organised by Corr Willbourn Research and Development.

Releases to the Environment (ACRE) for consideration before ACRE put its advice to Government. We judged the FSEs to be work of high scientific calibre. In essence, the experiments compared the impacts on aspects of biodiversity of herbicide regimes used on three GM herbicide-tolerant (GMHT) crops (maize, sugar beet and spring oilseed rape) with those used on conventional equivalent crops.

Our conclusions from the FSEs are as follows.

- If all else remains constant and the three crops are introduced and managed in the way they were in the trials, then for GMHT beet and spring oilseed rape a significant reduction would be expected in weed biomass and weed seed return resulting in fewer nectar resources for pollinators and fewer weed seed resources for granivorous birds. For GMHT maize the opposite is expected.
- These effects arise from the crop management regimes (i.e. the herbicide applications) associated with these GMHT crops, and are not a direct consequence of the way the crops have been produced.
- These data, and more that will follow, offer modelling opportunities to assess the longer-term and large-scale implications of this work, and will inform debate on broader agricultural issues related to societal choices and the balance of natural resources.
- That the findings of the experiments were different for different crops with GMHT traits reinforces the general conclusion in our First Report that impacts of GM crops must always be assessed on a case-by-case basis.

## **Section 4: Feedback on the First Report**

We reviewed the substantial range of comments and questions received by letter and on the website concerning the First Report, and considered to what extent these altered our conclusions. We were gratified to receive a broad range of responses, and pleased that respondents had the opportunity to raise new interpretations of the evidence or literature. We have responded when the feedback we received provided new information and/or extended the range of views previously discussed in the First Report. As part of the aspiration of the GM Science Review to provide a reference point/information source for the ongoing scientific and public consideration of this issue, the Second Report also provided an opportunity to clarify some of the points in the First Report.

## **Conclusion**

Our First Report stated that we had found no scientific case for ruling out all GM crops and their products, but nor did it give them blanket approval. We emphasised that genetic modification is not a single homogeneous technology and that its applications need to be considered on a case-by-case basis.

Whilst our Second Report does not alter this general conclusion, we have been prompted to clarify a number of points and explore some issues in more detail. For that we are grateful to

all those who provided us with feedback. This feedback and newly published research has helped us refine a number of arguments and has taken the process forward in terms of the science. In as much as we have systematically examined the issue of GM crops in the UK and have looked for areas of uncertainty and risk that may be addressed by research, we hope the Science Review will inform present policy debates and future research agendas.

