Public views on GMOs: deconstructing the myths

Stakeholders in the GMO debate often describe public opinion as irrational. But do they really understand the public? • *by Claire Marris*

There is no doubt that genetically modified organisms have a notoriously bad reputation in Europe. The anti-GMO lobby accuses proponents of this technology of pushing the introduction of GMOs into agriculture without adequately considering health and environmental risks. The pro-GMO camp charges its opponents with blowing potential risks out of proportion in order to manipulate public opinion against this new technology. During this mutual finger pointing, both sides have taken to blaming the public for a lack of understanding. Indeed, one often hears claims that: 'The media is to blame for the "hysterical" coverage of the issue', or: 'The problem is that the public does not understand the science behind biotechnology', or: 'Public acceptability will improve as soon as consumers see direct benefits'.

A typical demonstration of these arguments was made recently in this journal by Robert Marchant (Marchant, 2001). But this is not an isolated example; in the course of my research on the sociology of risk, I am constantly confronted with such perceptions about the public. However, these views—although prevalent among stakeholders in the GMO debate—are not supported by many years of social science research. I choose to call them 'myths' to indicate the fact that they appear so 'evident' that no further substantiation seems to be needed.

These myths are not restricted to the 'pro' or 'anti' GMO camps. Both sides, with minor exceptions, tend to share the same misconceived view about public understanding. Both believe that ignorance is a key problem, and develop strategies to 'educate the public'—even if the content of that 'education' is different. Both sides think that direct benefits to the consumer are a central determinant of public acceptance; thus the 'pros' seek to communicate the benefits, whilst the 'antis' try to demonstrate that these benefits will not be realised or that they will benefit commercial corporations rather than ordinary citizens. Both sides complain—at different times—that they cannot get their views expressed in the media.

Here, I will describe our results from the Public Acceptance of Agricultural Biotechnologies (PABE) project (CSEC, 2001) to demonstrate that these 'myths' are unsubstantiated. I claim that the very preponderance of these views of the public is a central feature of the GMO controversy, and suggest that the problem of 'public acceptability' of GMOs—as it is defined by many decision makers in the public and private sectors—cannot be resolved without deconstructing these myths and the influence they have on institutional behaviour.

We studied the attitudes, discourses and strategies of the major stakeholders in the GMO controversy through interviews, analysis of documents and by observing participants during public debates and other meetings. These stakeholders included biotechnology companies, major food manufacturers, large food distributors, government departments and regulatory agencies, expert committees, scientists and their institutions, farmers' unions, environmental and consumer protection groups as well as other non-governmental organisations.

Through focus groups, we also investigated how members of the general public perceive the use of GMOs in agriculture. Fourteen two-hour group discussions, with 6–10 participants per group, were held in France, Germany, Italy, Spain and the UK between September 1998 and October 1999. This article focuses on views that were prevalent in all of the groups studied.

During this research we identified a number of 'typical myths' about the public's perception of GMOs, which were promulgated by stakeholders but not supported by our focus group findings. Of course, they are not necessarily prevalent among all stakeholder institutions, or held in such extreme forms by all their members. For the sake of argument, however, extreme versions are presented.

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Myth 1: the public is 'for' or 'against' GMOs

According to this myth, the public either accepts or rejects GMOs, with most Europeans being increasingly against them.

PABE findings: overall, focus group participants expressed a rather ambivalent attitude. They did not reject or accept GMOs out of hand, and discriminated between different types of GMOs. Participants discussed arguments both for and against GMOs, and were aware of contradictions within these arguments. A key finding was that participants did not react so much to genetic modification as a

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Key questions about the use of GMOs revealed by PABE:

Why do we need GMOs?
Who will benefit from their use?
Who decided that they should be developed and how?
Why were we not better informed about their use in our food, before their arrival on the market?
Why are we not given an effective choice about whether or not to buy these products?
Have potential long-term and irreversible consequences been seriously evaluated, and by whom?
Do regulatory authorities have sufficient powers to effectively regulate large companies who wish to develop these products?
Can controls imposed by regulatory authorities be applied effectively?
Who will be accountable in cases of unforeseen harm?

specific technology, but rather to the institutional context in which GMOs have been developed, evaluated and promoted (see sidebar).

Myth 2: the public is 'irrational and unscientific'

According to this myth, there are facts on one side of the debate and emotions on the other. Rational facts are founded on scientific evidence and demonstrate, to the best of our knowledge, that GMOs are safe. Thus, people who oppose GMOs are irrational; if only they understood the science better, they would accept GMOs. Reference is frequently made to results from Eurobarometer surveys in order to support this view; in particular that '70% of the population thinks that ordinary tomatoes do not contain genes, whereas genetically engineered tomatoes do' (Hoban, 1998; Marchant, 2001).

PABE findings: indeed, understanding the nature of genetic modification, although varied between individuals and countries, was often rather limited. In particular, participants tended to be unsure about the technical distinction between conventional breeding methods and recombinant DNA techniques. But this would be better described as a lack of knowledge, rather than firmly held false beliefs about this technology. Participants were conscious of this technical ignorance, and admitted it readily. More importantly, the principal concerns expressed about GMOs were not based on erroneous information and would, therefore, not be addressed by more science education. Thus, even if we could wave a magic wand and create a world tomorrow where all citizens knew that all tomatoes contain genes, the basic questions (in sidebar) would remain unanswered, and the controversy would be unlikely to abate. Indeed, there is evidence that more knowledge about GMOs makes people more sceptical or polarised, not less (Martin and Tait, 1992; Gaskell *et al.*, 1998).

Myth 3: people are obsessed with the idea that GMOs are 'unnatural'

According to this myth, members of the public are concerned about GMOs because they think that genetic modification is 'unnatural'. They do not realise that humans, through breeding, have been manipulating the genetic makeup of crops and farm animals for 10 000 years.

PABE findings: GMOs were indeed frequently characterised as 'unnatural' by focus group participants. They expressed the feeling that directly modifying the genome was qualitatively different from any previously used technique. A common viewpoint was that we have previously only been crossing already existing organisms, while we are now also creating novel life-forms that would not have existed otherwise. Thus, genetic engineering techniques were described as 'pushing Nature beyond its limits', and were thought to 'upset the equilibrium of Nature'. This was related to the idea that scientists do not know or understand the full extent of their work, and cannot anticipate the long-term consequences of their actions on ecosystems, human health and social relations. It was in this sense that participants spoke of 'playing God', describing those involved in the creation and management of GMOs as 'sorcerers' apprentices'.

Furthermore—and contrary to popular belief—many of the concerns expressed about GMOs, including those about 'unnaturalness', were also expressed in relation to other agricultural innovations, such as the use of pesticides, animal-derived animal feed and antibiotics in animal feed. Participants felt that such developments were driven by the need or desire for increased productivity, regardless of health and environmental considerations, thus leading to uniform and tasteless food. The concept of organic agriculture was perceived as reversing or opposing this development, whereas GMOs were perceived as the ultimate incarnation of this trend.

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Myth 4: agricultural versus medical use of GMOs

According to this myth, people are concerned about the use of GMOs in agriculture, but not about their use for the production of pharmaceuticals. The underlying argument is that people only accept new products or technologies when they are perceived to provide direct personal benefits. Thus, people can see direct benefits of medical GMOs, whereas for agricultural GMOs—at least for those produced so far—consumers do not detect any personal advantage. Following this logic, proponents and opponents of GMOs believe that if the 'next generation' of agricultural GMOs provide direct benefits for consumers, public acceptance will increase.

PABE findings: participants did make a distinction between food and medical applications of GMOs, and were, on the whole, more willing to accept the latter. The perceived benefits associated with medical applications provided a clear argument in their favour. But this was not the only or even the dominant argument.

Rather, those questioned felt that matters of choice, transparency and

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information are very differently treated in the two sectors. Indeed, drugs were seen as typically being taken upon consultation with a doctor, who explains the pros and cons of the prescription, and patients are supplied with extensive safety notices detailing any potential side-effects. Furthermore, this information is adapted to the particular individual who can decide whether he or she will take the medicine. In addition, participants were aware that medicines are rigorously tested prior to commercialisation and monitored even after approval. In this context, thalidomide was frequently cited as a positive example demonstrating that a product can be withdrawn when harmful effects occur, despite prior testing.

In addition to these arguments, a dominant theme was that medicines are administered to a small, targeted portion of the population who need it at a precise point in time and for a particular defined period. This was contrasted with food, which everybody has to eat, including vulnerable people, such as the very young, old, or those with allergies.

Myth 5: BSE 'amalgam'

According to this myth, virulent reactions against GMOs are due to an unfortunate series of previous and ongoing food scandals in Europe. People have been 'over-sensitised' and now react in a disproportionate and irrational way to any new story about food risks, however small. An extreme version of this myth argues that people erroneously amalgamate BSE with GMOs: they do not understand the science well enough to understand that there is no link between the two, since prions contain no DNA.

PABE findings: the focus group participants indeed linked GMOs to other 'affairs'—most notably BSE. Food-related scandals, such as Coca-Cola contamination, dioxins in animal feed and the use of pesticides, were often cited. But the association between such 'affairs' was not based on confusion about the biological processes involved but rather on the daily encounters participants had with the institutions involved (see list of lessons). From their own personal experience about human fallibility and previous institutional failures, they felt that corruption, fraud and lack of resources is nothing unusual within control authorities.

Lessons the focus group participants had learnt from BSE and the many other 'affairs':

It is impossible to anticipate all risks—especially in the long term
Uncertainty is not admitted and not taken into account in the decision-making process
Preventative action is delayed even when risks become apparent
Even when rules are established, they are not strictly adhered to
There is no transparency in decision-making
Important decisions which influence our lives are made by unaccountable, 'alien' institutions over which we have no control

Myth 6: demand for 'zero risk'

According to this myth, people demand 'zero risk', which is not realistic as we all face risks in our daily activities. If we had applied a zero risk policy in the past, we would not have developed technologies such as the steam engine, electricity or the motorcar.

PABE findings: focus group participants never demanded 'zero risk'. They were perfectly aware that their lives are full of risks that need to be counter-balanced against each other and against the potential benefits. Rather than zero risk, what they demanded was a more realistic assessment of risks by regulatory authorities and GMO producers. The participants found expert statements—asserting that there are no risks—disconcerting and untrustworthy.

Myth 7: selfish about the Third World

According to this myth, people do not realise that GMOs can improve food production in developing countries. It is selfish for citizens in First World countries to block technologies that could benefit people in the Third World (Herrera-Estrella and Alvarez-Morales, 2001).

PABE findings: in general participants were aware of the argument that agricultural GMOs could perhaps improve living conditions in developing countries, but they tended to be sceptical as to whether such research would ever be carried out. They believed that it is a hypocritical argument put forward by companies producing GMOs: people felt that if that was the main benefit associated with agricultural GMOs, why is Europe, with its over-production of food, being 'flooded' with GMOs from the USA? They also believed that development of GM crops for Third World countries could be better achieved through public-funded research institutions; yet current research is dominated by private companies.

People felt that if feeding the Third World was the main benefit associated with agricultural GMOs, why is Europe, with its over-production of food, being 'flooded' with GMOs from the USA?

Our results suggest that an apparent 'social acceptability' of a technology or a product does not necessarily demonstrate satisfaction with the related social and scientific processes

Conclusions

PABE did not aim to directly analyse or measure public behaviour, such as consumer behaviour or 'propensity for anti-GMO action'. The approach used, however, helps to identify consumer concerns even if they still buy GM food, and even if they do not visibly oppose GMOs. Our results suggest that an apparent 'social acceptability' of a technology or a product does not necessarily demonstrate satisfaction with the related social and scientific processes. Indeed, qualitative data from our focus groups

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and from similar research (Grove-White, 1997, 2000; ESRC 1999; Waterton and Wynne, 1999) indicate that deep-felt concerns often persist and accumulate. In this way they help to shape people's understanding of the world, which is then used to determine views about other issues. Such 'invisible concerns' can therefore have important long-term effects on public reactions to technological innovations.

The perceptions of GMOs elicited through the PABE research were clearly shaped by the participants' previous experiences with other issues, which, in their view, were very similar. BSE was the most frequently stated example. However, the links made between these two issues have perhaps not been fully understood by policy-makers and experts, who tend to focus on the idea that regulatory institutions—and science in general—are no longer trusted. As a result, they just ask themselves 'how can we better communicate in order to regain trust?' without considering that public attitudes are largely shaped by institutional behaviour, not by public relation exercises. Thus, instead of focusing on ways to modify public views in order to make them 'more rational', institutions should perhaps pay more attention to their own behaviour.

Indeed, health-related 'affairs', such as asbestos, pesticides or HIV-contaminated blood, support the participants' view that the potential for harmful side-effects—and the uncertainty about it—is often not taken into account sufficiently in decision-making about new products and technologies, or in measures to monitor risks once the product or technology is on the market.

Our focus group participants used such experiences concerning the interconnection of scientific innovation, regulation, commercial pressures and the complexities of social and ecological systems to construct their opinion about GMOs. The participants knew and accepted that it was necessary to counter-balance risks with benefits, but felt that they were not told how this judgement had been made, and were not invited to participate in this process. They, therefore, suspect that in the regulation and management of risks, economic interests often override health and environmental considerations.

It is obvious that public opinion has had a significant impact on the development and marketing of GMOs in Europe. At the same time, the current situation does not fully satisfy any of the stakeholders. Our research suggests that one reason for this situation is not a lack of public understanding of the science but rather policies that continue to be based largely on erroneous beliefs about 'the public'. Clearly, there is a mismatch between the way in which institutions comprehend public perceptions, and the attitudes expressed by the participants in our focus groups. Exploring this apparent discrepancy is important, because new policies and strategies to introduce GMOs—even if they are innovative and honestly seek to integrate public views—are prone to failure if they continue to be based upon these 'myths'.

Instead of focusing on ways to modify public views in order to make them 'more rational', institutions should perhaps pay more attention to their own behaviour

Acknowledgements

'Public Perceptions of Agricultural Biotechnologies' (PABE), was funded by the Commission of European Communities under the ELSA (Ethical, Legal and Social Aspects of the Life Sciences) component of the FAIR programme (Agriculture and Fisheries), 1998–2000. The author participated in the project while at the C3ED, Université de Versailles-Saint-Quentin-en-Yvelines.
The author wishes to thank all the participants in the project for their contribution to the viewpoint presented here. Co-ordinators: Brian Wynne and Peter Simmons, CSEC, Lancaster University. In Italy: Bruna de Marchi (ISIG) and Luigi Pellizzoni (Unisersità di Trieste); in Germany: Ortwin Renn, Florian Lattewitz and Andreas Klinke (Akademie für Technikfolgenabschätzung in Baden-Württemberg); and in Catalonia: Louis Lemkow, Ramon Sentmartí and Johanna Cáceres (Universitat Autónoma de Barcelona). This article does not necessarily reflect the opinion of every member of the team, nor the European Commission's views.

References

CSEC (2001) Public attitudes to agricultural biotechnologies in Europe: final report of PABE project, CSEC, Lancaster University. (http://www.lancs.ac.uk/users/csec/)

ESRC (1999) The politics of GM food: risk, science and public trust. ESRC Global Environmental Change Programme, Special Briefing No. 5. (http://www.gecko.ac.uk)

Gaskell, G., Bauer, M. and Durant, J. (1998) Public perceptions of biotechnology in 1996: Eurobarometer 46.1. In Durant, J., Bauer, M. and Gaskell, G. (eds), *Biotechnology in the Public Sphere: a European Sourcebook*. Science Museum, London, UK, pp. 189–214, pp. 199–200.

Grove-White, R., Macnaghten, P., Mayer, S. and Wynne, B. (1997) Uncertain world: genetically modified organisms, food and public attitudes in Britain, CSEC, Lancaster University. (http://www.lancs.ac.uk/users/csec/)

Grove-White, R., Macnaghten, P. and Wynne, B. (2000) Wising up: the public and new technologies, CSEC, Lancaster University. (http://www.lancs.ac.uk/users/csec/)

Herrera-Estrella, L. and Alvarez-Morales, A. (2001) Genetically modified crops: hope for developing countries? *EMBO Rep.*, **2**, 256–258.

Hoban, T.J. (1998) Trends in consumer attitudes about agricultural biotechnology. AgBioForum 1, Summer 1998, pp. 3–7.

Marchant, R. (2001) From the test tube to the table. *EMBO Rep.*, **2**, 354–357.

Martin, S. and Tait, J. (1992) Attitudes of selected public groups in the UK to biotechnology. In Durant, J. (ed.), *Biotechnology in Public: a Review of Recent Research*. Science Museum, London, UK, pp. 28–41.

Waterton, C. and Wynne, B. (1999) Can focus groups access community views? In Barbour, R. and Kitzinger, J. (eds), *Developing Focus Group Research: Politics, Theory and Practice*. Sage, London, UK.

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DOI: 10.1093/embo-reports/kve142

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