

# How should we adapt our regulation of GM crops for the future?

Michael Antoniou and Rosie Hails disagree

The European Union is thought to have one of the most robust systems in the world for regulating genetically modified (GM) crops. But have we got it right?

## Dear Michael,

Faced with serious problems such as climate change, food security and pollution, we need novel solutions and the best science to guide our environmental decision-making. However our track record is not great – our current approach to regulating GM organisms misses the mark.

Via the regulatory process, independent scientists closely examine GM crops to consider what risks they may pose, but this does not include an explicit consideration of environmental benefits. So in weighing up benefits and risks in our search for sustainable solutions, information is missing.

Furthermore, legislation does not require other novel crops to undergo such scrutiny. Should we not also consider the consequences of introducing biofuel crops (for example)?

We have tough choices to make about how to feed a growing global population at the same time as mitigating and adapting to the effects of climate change. We should recast the debate about GM, to be a wider debate about how we manage the environment to produce the food, fibre and fuel we need, yet protect biodiversity, soil and water quality. Why not regulate agriculture according to novelty, considering both environmental impact and potential contribution to sustainable solutions, rather than the method by which the crop was produced?

Regards, Rosie

## Dear Rosie,

Solutions to the environmental and food production problems facing us must address their root causes. Otherwise, one risks a cover-up that can exacerbate the problems.

Hunger is caused by lack of access to food, not lack of food. Hunger is fundamentally a social, political, and economic problem, which GM technology does not and cannot address.

The World Bank and the UN Food and Agriculture Organisation have identified the rush to grow biofuels as the main cause of the current food crisis. GM companies focus on producing cash crops for animal feed and biofuels for affluent countries, not food for people.

The UN International Assessment of Agricultural Knowledge, Science and Technology for Development report authored by 400 scientists and endorsed by 58 governments (including the UK), concluded that GM crops have little to offer global agriculture and the challenges of poverty, hunger and climate change. Instead it recommends conserving low-input agro-ecological farming practices, whose use in the developing world have produced dramatic increases in yields and food security.

If a genuine need for a new technology exists, then it must be conceptually and technically sound. GM is not, being based on an outmoded understanding of how an organism's genes are organised and controlled. Therefore, not surprisingly GM has failed to deliver on its promises of lower agro-chemical inputs and higher yields.

Regards, Michael

## Dear Michael,

My argument is not to deregulate GM technology, nor is it that GM could 'solve the problem of world hunger'. Claims have been inflated on both sides, overstating the benefits and exaggerating the risks. However GM, alongside other new varieties produced by various techniques, will have benefits to offer, as long as the environmental impact of agriculture is properly managed.

I must challenge your statement that 'GM has failed to deliver promises of lower agro-chemical inputs'. This depends upon the GM crop and, most importantly, how it is managed. GM crops made resistant to insect pests can reduce agro-chemical use; there are many studies in the peer-reviewed scientific literature which show improved farmland biodiversity as a result. This is part of the holistic assessment I wish to promote.

This brings me back to my original point – which the rush to grow biofuels illustrates so well. (Currently no commercially-available GM crops are designed for biofuels, which are made equally well by conventional crops.) Displacement of food crops in Britain could lead to increased importation of foodstuffs from abroad, possibly negating any carbon gains offered by growing biofuels in the first place. So I repeat my main question: why not regulate agriculture according to novelty rather than the method by which the crop was produced?

Regards, Rosie

### Dear Rosie,

You seem to imply that, once a GM food product has been approved, it is safe. Products made by novel methods based on rapidly advancing science, and which possess a recognised unpredictable component such as GM transformation, need to be constantly reviewed. Their health and environmental impact should be monitored post-marketing. Here, governments have unfortunately let society down.

Regulators have not fully taken on board that fact that GM transformation is highly mutagenic in a manner distinct from other artificial plant breeding methods (for example, irradiation, chemical mutagenesis). This can disrupt biochemistry, leading to novel toxins and allergies.

The uniquely mutagenic effect of GM transformation can largely explain poorer GM crop performance, and partly account for the now well-documented, very worrying negative health impacts in animal feeding studies. This includes multiple organ damage (liver, kidney, gut); immune system dysfunction including allergic reactions; decreased fertility and increased ageing rates. These observations need to be explained, not dismissed or denied as appears to be the attitude of GM crop advocates.

If these GM feeding studies were conducted in advance, rather than after release, it would have been totally contrary to good scientific practice to approve them.

Regards, Michael

### Dear Michael,

What is your alternative to a science-based regulatory system: an embargo on the development of any new technology? How will this help us develop more sustainable land management practices?

One of the strengths of the current system is that it does examine the GM crop for any unexpected consequences from the insertion of the transgenes – including the potential for any novel toxins and allergens. There is also a post-market monitoring requirement. These are strengths. The weakness is that the system only considers environmental risks posed by GM crops when it should include the consequences of widespread introduction of other novel crops (such as biofuels).

I refute your claim that animal feeding studies show well-documented negative health impacts. The studies I presume you refer to<sup>1</sup> have been reviewed by an independent panel of distinguished European academics. They did not 'dismiss' these claims, but considered the strength of the evidence. They are not 'GM advocates' but independent experts. They found no negative health impacts.

We should be guided by the best science. We need to explore all possibilities, including GM, to lighten our environmental footprint and facilitate food production when and where it is needed. We need to do this in the context of a reformed regulatory system which considers the bigger picture, encompassing all novel crops and agricultural practices.

Regards, Rosie

<sup>1</sup> Studies by Puztai, Serralini, Ermakova, Velimirov: See [http://www.efsa.europa.eu/EFSA/ScientificPanels/efsa\\_locale-1178620753812\\_GMO.htm](http://www.efsa.europa.eu/EFSA/ScientificPanels/efsa_locale-1178620753812_GMO.htm)

### Dear Rosie,

The European Food Safety Authority (EFSA) does not inspire universal confidence and its independence can be questioned. The head of the genetically modified organism (GMO) panel has worked with industry. EFSA considers toxicity tests for GM foods in mammals should last at best three months. This is inadequate to evaluate life-long consumption of GM foods and any negative effects from GM mutagenesis or high levels of herbicide residues and/or novel Bt toxins that are present in GM crops. Incomprehensively, EFSA has acknowledged that, even during three-month tests, sex-specific significant findings are not important!<sup>1</sup> Research to identify the underlying causes of observed toxicity is required, not flawed logic.

Recently, the EFSA chief scientist resigned because he opposed the reassessment of GMOs requested by the European Council of Ministers of Environment. Despite EFSA approval, several EU nations have banned cultivation of MON810 GM maize.

Given inherent unpredictability, regulation is not going to make environmental release of GMOs safe. The only responsible use of GM is under contained laboratory and clinical conditions.

Proven 'alternatives' to GM exist: hardy crops, which can flourish under harsh conditions. Traditional cross-breeding, augmented by marker assisted selection (gene mapping), has scored many successes including blight resistant millet and drought tolerant rice; properties beyond what GM can deliver. Therefore, GM crops are a risk that is simply not worth taking.

Regards, Michael

<sup>1</sup> Serralini GE, de Vendômois JS, Cellier D, Sultan C, Buiatti M, Gallagher L, Antoniou M, Dronamraju KR. (2009) How subchronic and chronic health effects can be neglected for GMOs, pesticides or chemicals. *Int J Biol Sci.*, 5: 438-443.



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