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Genetically modified crops and the 'food crisis': discourse and material impacts

Glenn Davis Stone and Dominic Glover

A surge of media reports and rhetorical claims depicted genetically modified (GM) crops as a solution to the 'global food crisis' manifested in the sudden spike in world food prices during 2007–08. Broad claims were made about the potential of GM technologies to tackle the crisis, even though the useful crops and traits typically invoked had yet to be developed, and despite the fact that real progress had in fact been made by using conventional breeding. The case vividly illustrates the instrumental use of food-crisis rhetoric to promote GM crops.

Les cultures génétiquement modifiées et la « crise alimentaire » : discours et impacts matériels
Une vague de rapports médiatiques et d'affirmations rhétoriques ont décrit les cultures génétiquement modifiées (GM) somme une solution à la « crise alimentaire mondiale » qui s'est manifestée dans la pointe soudaine des prix mondiaux des produits alimentaires durant 2007 et 2008. Des affirmations générales ont été faites sur le potentiel des technologies GM à résoudre la crise, alors même que les cultures et traits utiles généralement invoqués n'avaient pas encore été développés et en dépit du fait que des progrès réels avaient déjà été accomplis en utilisant la reproduction conventionnelle. Ce cas illustre de façon frappante l'utilisation instrumentalisée de la rhétorique de la crise alimentaire pour promouvoir les cultures GM.

Culturas geneticamente modificadas e a "crise alimentar": discurso e impactos materiais
Uma onda de reportagens na mídia e argumentações retóricas apontaram as culturas geneticamente modificadas como uma solução para a "crise alimentar global" que se manifestou com o aumento repentino nos preços mundiais dos alimentos durante 2007–08. Argumentava-se em geral sobre o potencial das tecnologias GM de lidar com a crise, mesmo embora as culturas e características úteis tipicamente invocadas tivessem ainda de ser desenvolvidas e apesar do fato do progresso real ter sido alcançado na verdade utilizando-se cultivos convencionais. O caso ilustra vividamente o uso instrumental da retórica da crise alimentar para promover culturas GM.

Cultivos genéticamente modificados y "crisis alimentaria": discurso e impactos materiales
Un torrente de reportajes mediáticos y de afirmaciones retóricas difundió la idea de que los cultivos genéticamente modificados (GM) eran la solución para la "crisis mundial de alimentos" que se hizo presente tras el gran aumento en los precios de los alimentos en 2007-2008. Muchas voces

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proclamaron que las técnicas de modificación genética solucionarían la crisis, a pesar de que la utilidad y características de tales cultivos todavía no se habían investigado, y a pesar de que los avances en realidad se habían alcanzado a partir de cultivos tradicionales. Este caso demuestra claramente cómo la retórica sobre la crisis de alimentos puede utilizarse para promover cultivos GM.

KEY WORDS: Environment; Governance and public policy

In Spring 2008, with the global spike in food prices near its peak, print and online media were alive with stories linking the problem and its solution to genetic modification (GM) of crops.[1] Headlines included 'Gene modified crops the key to food crisis, says scientist' (Harvey and Parker 2008) … 'Biotechnology Can Help Solve the Food Crisis' (Engineering News Online 2008) … 'Biotechnology Could Help Solve Food Crisis, Monsanto Asserts' (Copans 2008) … 'GM crops are part of the answer to food crisis – Monsanto' (Surman 2008) … 'Radical Science Aims to Solve Food Crisis' (Moskowitz 2008) … 'Biotechnology a Key to Solving Food Crisis' (Reuters 2008) … 'Genetic Farming can Help Solve Food Crisis: Expert' (Basu 2008) … 'Biotechnology May Have Potential to Solve Food Crisis' (Energy & Envirofinland 2008) … 'Brown[2] must embrace GM crops to head off food crisis – chief scientist' (*The Guardian* 2007) …'Genetically modified crops "may be answer to global food crisis"' (*The Telegraph* 2008) … 'Biotech crops seen helping to feed hungry world' (Reuters India 2008a) …and 'World Goes for GM Crops to Tackle Food Crisis' (Commodity Online 2008) – among many others.

This media coverage raises interesting and important questions about the material relationships between the food crisis and technology: for instance, what role, if any, did GM crops play in the crisis, and did they mitigate it (or could they have)? The actual and potential impact of GM crops on the price spike, the shortages, the hunger, and the riots turns out to have been negligible; as we show below, the only documented impact was on soft drinks and snack foods in industrialised countries. This then raises a second set of questions, about discourse: who says what about the relationship between GM crops and the food crisis, why do they say it, and what impacts does the discourse itself have? These issues are significant because crises open doors to new and enhanced impacts on perceptions and actions. Food crises can be particularly consequential, even potentially transformative, in biotechnology debates, since so many stakeholders advocate the technology as a sine qua non in the fight against world hunger. Especially during situations that spark unusual levels of attention to causes, consequences, and solutions, what is said about this contested technology really matters. We first examine the relationship between the claimed and actual (or potential) contributions of genetically modified crops to the food crisis, and then identify the key aims of the flood of media attention.

The general and the specific

In spite of explicit claims by industry spokespeople, academics, and government officials that GM technology could help to solve (or was even essential to solving) the recent food crisis, virtually none of the claims in 2008 identified how any specific GM crop or technology was helping or would help to alleviate the immediate crisis. Below the headlines, the discussion inevitably veered into a general call for raising agricultural productivity. In perusing the

wave of articles, we find ourselves in a kind of 'echo chamber', in which various non-specific claims are continually repeated and amplified.

The article 'World goes for GM crops to tackle food crisis' (Commodity Online 2008) is representative, stating that *'countries across the world are now rushing to embrace genetically modified crops to tackle their food crisis'*, but going on to summarise only a number of theoretical benefits of genetic modification. For specifics, it notes that China *'now is ready to tip that scale in favour of genetically modified crops'*, and specifically that it is *'on the verge of releasing an insect-resistant rice variety'*. However, China was grappling with the science and politics of GM rice long before the recent food crisis (Kahn 2002) and continues to do so, still without having approved it, and with no indication that the food crisis has affected its policy (Liu 2009). This article also cites Europe as joining Asia and Africa in watering down restrictions on GM crops, although the only major regulatory decisions made in Europe since the food-price hike have been bans imposed on MON-810 transgenic maize by France and Germany (Neely 2009).

In 'GM crops are part of the answer to food crisis – Monsanto', the Farmers Guardian reported Monsanto's claim that GM crops could *'help meet the burgeoning food demand and tackle issues such as climate change and water shortage'*, and that *'GM crops can offer higher yields than conventional crops … and could therefore form part of the solution to the current food crisis'* (Surman 2008). However, the concrete examples offered by the company lay far into the future, including drought-tolerant maize being developed for the USA, which might raise yields in Africa in 15 to 20 years' time, and crops that could use nitrogen fertiliser more efficiently (where nitrogen fertiliser is available), which are expected to take a decade to come to fruition.

It is important to note that claims of potential benefits of GM crops for impoverished populations can be explicitly reasoned. Several writers have made specific cases for the potential benefits of GM crops such as insect-resistant brassicas and apomictic maize (summarised by Stone 2010). For example, Stone (2002) made a case for the use of genetic modification in the nutritional enhancement of cassava, because (a) cassava is a crop with poor nutritional qualities which (b) produces well below its potential in much of Africa; (c) cassava is a flexible cash/subsistence crop of the poor; (d) nutritionally enhanced cassava would likely be a non-input intensive crop (as compared with Green Revolution grains); (e) it is a 'vegetatively propagated' crop, which is therefore likely to remain beyond the proprietary control of agricultural capital; and (f) it is a slow and difficult crop to improve through conventional breeding. He did not, however, tout this as a means of mitigating a food crisis; functional and safe nutrition-enhanced cassava was nowhere near release, and there was no obvious source of funding for the regulatory science required for a crop with so little profit potential.

Such considerations must also be updated as conditions change. For instance, in recent years there has been significant progress in both nutritional enhancement and virus resistance in cassava through both genetic modification and conventional breeding, potentially changing the relative merits of the two approaches. But such arguments have been strikingly absent in the extensive media coverage of agri-biotechnology as a solution to the food crisis. The bluntest summary of agri-biotechnology's likely contribution to tackling the 2007–08 food crisis (or food crises for a generation ahead) came from a surprising source.

> *Martin Taylor, chairman of Syngenta, said the current industry focus on farmers in rich countries meant that it would take 20 years to launch crop varieties designed to address the problems of the developing world. He told* The Guardian: 'GM won't solve the food crisis, at least not in the short term'. *His words appear to contradict statements by UK politicians, industry bodies, and the European Commission that GM technology should*

> *be considered as a way to address chronic shortages and soaring prices of basic staples across the world* (Adam 2008).

Taylor's candid assessment was evidently out of step with many other pro-biotechnology advocates, but it is consistent with the fact that the food price spikes of 2007–08 led to no significant increase in shipments of GM foods to developing countries. In fact, the main material impact of GM crops on the food crisis of 2007–08 involved not feeding the hungry, but tweaking food commodity chains for the well fed. The *New York Times* reported in April 2008 that soaring food prices were *'bringing new pressures on governments, food companies and consumers to relax their long-standing resistance to genetically modified (GM) crops'* (Pollack 2008b), but the actual material change resulting from the food crisis was that

> *in Japan and South Korea, some manufacturers for the first time have begun buying genetically engineered corn for use in soft drinks, snacks, and other foods. Until now, to avoid consumer backlash, the companies have paid extra to buy conventionally grown corn. But with prices having tripled in two years, it has become too expensive to be so finicky* (Pollack 2008b).

If the wave of media coverage did not actually make any specific arguments for biotechnology as a means to mitigate the food crisis, then what was it intended to do? We argue that it had two overriding discursive aims. The first was to define an acute problem in commodity prices as a chronic problem of agricultural underperformance, thereby turning discussion towards the need for production-enhancing agricultural technologies. The second aim was to enhance the image of specific pipeline agri-biotechnologies, by associating categories of crop improvement with the science of genetic modification, and by redefining agricultural crises as problems in crop biology.

Constructing an acute problem as chronic

The mainstay of this discursive strategy is the substitution of chronic food shortage – a problem to be resolved by creating higher-producing crops through biotechnology in the future – for an acute food shortage – the particular spike in food prices during 2007–08. This strategy repeats an entrenched Malthusian account of food supply problems, in which specific food shortages are interpreted as evidence of a wider underlying problem of food scarcity caused by overpopulation (Lohmann 2005). To Collier (2008), for instance, the cause of the food crisis boiled down to the *'spectacular economic growth of Asia'*, despite the fact that there was no particular surge in economic growth, population, or demand coinciding with the food-price spike.

This neo-Malthusian interpretive framework has proved remarkably resilient, despite repeated demonstrations of hunger coexisting with food abundance, widespread recognition of Amartya Sen's (1981) entitlements thesis, and a sophisticated academic literature on the complex and contingent combinations of political, economic, social, institutional, and agronomic problems that lead to particular patterns of deprivation and famine (Devereux *et al.* 2002). Although the world's steadily rising food needs very probably will require continued expansion of agricultural productivity, agricultural capacity had been steadily growing before the appearance of genetically modified crops, and agricultural growth has consistently been projected to continue outpacing population (FAO 2002; FAO 2003).

Advancing specific biotechnologies

Having argued that tackling the food crisis meant raising the productivity of crops, it was a small step to conflating crop improvement in general with transgenic crop improvement in

particular. In numerous cases, biotechnology approaches were highlighted, even where more near-term advances have already been made by conventional means. Specific claims have virtually all been concerned with GM technologies being researched, rather than with currently available technologies to increase food supplies.

A notable example was drought tolerance. When the US Bush administration inserted an advocacy component for GM crops into an aid package that was presented at the peak of the food crisis, a food-aid expert on the White House's National Security Council explained that *'We certainly think that it is established fact that a number of bio-engineered crops have shown themselves to increase yields through their drought resistance and pest resistance'* (Hedges 2008). This assurance seems misplaced, given that drought-tolerant traits have not yet reached the market. Similarly, Collier (2008), citing an unspecified overview by South African biotechnologist Jennifer Thomson (presumably Thomson 2008), singled out the potential for developing drought-resistant maize, fungi-resistant grains, and stem-borer-resistant maize. With the exception of the last, which is currently available, these interventions appear to concern possible future food crises, as underscored by Collier's point (Collier 2008) that drought-tolerant maize is expected to buy Africa time in the *'struggle against climatic deterioration'*. A few months later, Monsanto press releases generated a flurry of articles in major US and European newspapers, touting work on drought-tolerant crops that could be ready in four years (Pollack 2008a; Randerson 2008).

Drought was certainly a contributory factor in the 2007–08 food crisis (Bradsher 2008; Herren 2008), and drought tolerance is obviously a sensible priority for biotechnology research. Yet GM technology is not the only promising path towards that goal, and it is not the one that has already made headway in farmers' fields. The conventionally bred drought-resistant rice variety Ashoka 200F has been spreading through India since 2001 (Virk *et al.* 2007). Another drought-tolerant, non-GM upland rice variety, Birsa Vikas Dhan 111, was released to farmers in the Indian state of Jharkhand in May 2009 (SeedQuest 2009). Drought-tolerant corn bred by conventional methods at CIMMYT is being grown in sub-Saharan Africa, reportedly yielding 20–50 per cent more than local varieties during droughts (Pollack 2008a). Conventionally bred drought-tolerant cassava is now being grown in semi-arid zones of sub-Saharan Africa, reportedly producing between six and 10 times more per hectare than traditional varieties under normal farmer-managed conditions (IITA 2008). If the aim of this media coverage was to highlight scientific success in combating drought, then it is odd that these concrete accomplishments of conventional research were ignored in favour of unproven technologies being studied.

The political setting for the food crisis of 2007–08 was inflected with concern about climate change and energy production; there was concern that the increasing demand for biofuels was at least partly responsible for driving up food prices (*Guardian* 2008). GM traits were proposed as key technologies, either for adapting to climate change (as with drought tolerance) or for mitigating its effects. The nexus with biofuel debates provided a convenient platform for biotech advocates to tout the potential of transgenic approaches to optimise the energy performance of biofuel crops, such as sugar cane and *jatropha* (Reuters India 2008b). Industry-sponsored research reports, which estimated that GM crops were responsible for a reduction in greenhouse-gas emissions from agriculture amounting to thousands of millions of kilograms (for example, Brookes and Barfoot 2006), received significant coverage at the height of the food crisis from pro-biotech organisations and bloggers (such as Johnston 2008). The media also picked up on another report from the same source, published in June 2008, which argued that the spike in food prices would have been even higher if it had not been for the contribution of GM technology in previous years (Brookes and Barfoot 2008; Food Navigator 2008).

Evidently, a key theme in the food-crisis discourse has been to interpret the causes of the crisis in ways that fit the GM crops that have been commercialised, or transgenic crop-research programmes that happen to be under way. For instance, in 'Radical Science Aims to Solve Food Crisis' (Moskowitz 2008), the head of an academic biotechnology laboratory made a smooth transition from the use of genetic modification to mitigate the food crisis by raising wheat and rice yields into a description of how engineering sorghum might improve its nutritional profile. However, it is reasonable to question whether nutritive deficiencies in sorghum had any connection to the food crisis or are even a significant problem in feeding Africa. Sorghum is in most ways quite a nutritious crop, whose anti-nutritive properties are largely mitigated by customary preparation methods such as fermentation (Awika and Rooney 2004; Osman 2004).

Conclusion

Our discussion of the discourse surrounding genetic modification of food during the global food crisis of 2007–08 suggests that, while the crisis was real, the purported agri-biotechnology solution was a figment of opportunistic spin. While the crisis led to very minor change in biotech food-supply chains, mainly affecting treats consumed by industrialised Asian countries, there was a surge in media coverage and commentary about the potential role of biotechnology to solve the food crisis. Biotechnology advocates used media platforms to conflate acute and chronic food shortages and generate publicity for specific transgenic technologies that had only distant or long-term connections to ways of resolving the immediate crisis.

Notes

1. Genetic modification is a category of biotechnology in which DNA is directly manipulated, usually by inserting genes from different organisms. 'Genetically modified' is roughly synonymous with 'transgenic'.
2. Former UK Prime Minister, Gordon Brown.

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