

Contrary to popular belief

Three decades after transgenes were first introduced into plants, why do so many consumers remain so negative about genetically modified (GM) food?

GM food has an uncanny ability to spook consumers. It does not matter that many of us have been consuming GM cornflakes, sweet corn, starches and sugars in processed food for over a decade. It does not matter that no adverse health effects have been recorded from eating them. Nor does it matter that august agencies, such as the World Health Organization, the US National Academy of Sciences, the European Commission or the American Medical Association, have come out with ringing endorsements of their safety. The fact is, negative attitudes remain entrenched and widespread. And changing them will require a concerted and long-term effort to develop GM foods that clearly provide convincing benefits to consumers—something that seed companies have conspicuously failed to do over the past decade.

On p. 794, our Feature asks why the same circuitous debates and concerns keep circulating regarding the health risks of GM food. This time last year, a peer-reviewed paper by French scientists, claiming that glyphosate-resistant corn causes tumors in Sprague Dawley rats (*Food Chem. Toxicol.* **50**, 4221–4231, 2012), sparked a media circus about the cancer risks of eating GM corn. This methodologically and statistically flawed study—the claims of which have since been debunked—grabbed headlines around the world and provided shocking images of animals overgrown with tumors.

The report and others like it making extraordinary claims about health risks represent a tiny minority of all the peer-reviewed studies on GM food. But each time one is published, anti-GM activists seize upon it, no matter how flimsy the evidence or flawed the study design. And all too often, an uncritical and sensationalist media leaps upon negative findings, continuing the cycle of scares, urban myths and downright mistruths about GM food, all of which serve to stoke consumer paranoia. How can there be smoke without fire?

After decades of controversy, the public now mistrusts most mainstream sources of data on GM food—large corporations, regulators, governments and even scientists. In contrast, nongovernmental organizations, environmentalists and advocacy groups (that often oppose GM food) are treated with credulity. They are, after all, more aligned with ‘consumer interests’.

Consumers are concerned about the close (some might say cushy) relationships between regulators and companies. They are concerned about food safety data being difficult to obtain from regulatory agencies. The revolving door between agribusiness and regulatory agencies and the amounts spent on political lobbying also raise red flags. Even academics have fallen in the public's esteem, especially if there's a whiff of a company association or industry funding for research.

Of course, the public's misgivings about GM food go beyond just the risk to health. Corporate control of the food supply, disenfranchisement of smallholder farmers, the potential adverse effects of GM varieties on indigenous flora and fauna, and the ‘contamination’ of crops grown on

non-GM or organic farms all play into negative perceptions. And for better or worse, GM food is now inextricably linked in the public consciousness with Monsanto, which has seemingly vied with big tobacco as the poster child for corporate greed and evil.

A more fundamental problem is that the public debate has been framed in the wrong terms all along. For consumers, the question revolves around GM food or non-GM/organic food. But in terms of risk, how a food crop is created is totally irrelevant—it is what is in the food that is important.

This has not stopped European regulators from deepening existing prejudices against these products by creating a regulatory system that singles out GM products as sufficiently threatening to merit special attention. Even Monsanto and the biotech industry unwittingly have enhanced the false GM/non-GM dichotomy by parroting the agronomic benefits of any products under the GM umbrella. This has led to a debate framed by oversimplified pro-GM or anti-GM stances. Instead, the discussion should be about pros and cons of individual products: *Bt* corn or EPSPS soybeans and so on.

In the decades to come, children born into a world where GM food is more commonplace may come to see it as less alien and threatening. In the meantime, a key aim in overcoming negative perceptions about GM products should be to focus on crops addressing consumer needs as well as producer needs, which cannot be produced via other means.

In the Philippines, beta carotene-enriched Golden Rice is currently being prepared for regulatory submission. Golden Rice can provide a useful adjunct to diets in areas like the Philippines, where lack of vitamin A frequently causes blindness, simply because alternative vitamin A supplements are a never-ending expense for families. In contrast, the benefits of *Bt* brinjal for Filipino consumers are equivocal (p. 777).

In the 1990s, pioneering efforts led to the creation of two disease-resistant varieties of GM papaya in Hawaii, where the non-GM crop was almost wiped out by ringspot virus. Today, these comprise ~80% of the harvest. If genetic modification had not been available, papaya fruit would likely have disappeared from Hawaii, and consumers would have been affected.

A recent story in *The New York Times* (July 27, 2013) outlined a similar scenario unfolding in the orange groves of Florida, where the harvest is being threatened by citrus greening disease. Genetic modification is currently the only feasible route to create resistance. Until recently, growers had rejected GM oranges for fear of a consumer backlash. But reluctance has dwindled as they have been confronted with the possibility of having no oranges left to grow. Presumably, if OJ becomes a rarer and more expensive commodity in supermarkets, consumer attitudes to GM oranges may change, too.

Public perception of GM food will not become more positive overnight. But as more products meet unmet needs, small victories may be won. In the end, necessity may turn out to be the mother of acceptance.

