

# Genetically Modified Failures

GM foods make a lot of promises they simply can't live up to

"Unless and until there is both clear public and political acceptance of GM, it is proven to be both beneficial to the environment and to the producers, and evidence that demand for these products is based on understanding by consumers and transparent product labelling, the Government should not licence its commercial use in the UK, nor promote its use overseas."

— Parliamentary Environmental Audit Committee report, 2012 (section 2, Improving Knowledge)

"Biotechnology and GM crops are taking us down a dangerous road, creating the classic conditions for hunger, poverty and even famine. Ownership and control concentrated in too few hands and a food supply based on too few varieties of crops planted widely are the worst option for food security."

— Christian Aid report, "Biotechnology and GMOs", Jan 2000

## Failure to deliver

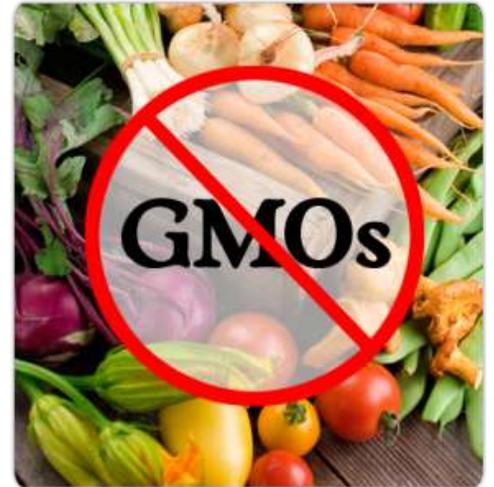
Despite the hype, genetic modification consistently fails to live up to industry claims. Only two GM traits have ever made it to market – herbicide resistance and BT toxin expression. Other promises of genetic modification have failed to materialise.

The much vaunted GM 'golden rice'<sup>1</sup> – hailed for a decade as a cure for vitamin A deficiency and night blindness still hasn't made it into the field. Trial plantings may go ahead in the Philippines 2013 but it remains untested in humans and now there is concern that high levels of beta carotene are unhealthy. Retinol, a breakdown product of beta-carotene which is dangerous in high doses can, in high doses, also cause carotenosis which stresses the liver and causes the skin to turn orange.

In 2004, the Kenyan government admitted that Monsanto's GM sweet potatoes were no more resistant to feathery mottle virus than ordinary strains, and in fact produced lower yields.<sup>2</sup> And in January 2008, news that scientists had modified a carrot to cure osteoporosis by providing calcium had to be weighed against the fact that you would need to eat 1.6 kilograms of these vegetables each day to meet your recommended calcium intake.<sup>3</sup>

## Costing the Earth

GM crops are costing farmers and governments more money than they make. A report by the Soil Association in 2003 estimated the cost to the US



economy of GM crops at around \$12 billion (£6 billion) since 1999, on account of inflated farm subsidies, loss of export orders and seed recalls.<sup>4</sup>

A study in Iowa found that GM soya beans required all the same costs as conventional farming but, because they produced lower yields, the farmers ended up making no profit at all.<sup>5</sup>

In India, an independent study found BT cotton crops were costing farmers 10% more than non-BT variants, and bringing in 40% lower profits.<sup>6</sup> In India, between 2001 and 2005, more than 32,000 farmers committed suicide, a portion of the blame for these deaths have been attributed to mounting debts caused by inadequate crops.<sup>7</sup>

## Contamination and gene escape

These days you can never be sure that what you are eating is GM-free. An article in New Scientist admits that contamination and cross-fertilisation between GM and non-GM crops "has

"In a study involving 94 articles selected through objective criteria, it was found that the existence of either financial or professional conflict of interest was associated [with] study outcomes that cast genetically modified products in a favourable light."

— Diels J, et al. Association of financial or professional conflict of interest to research outcomes on health risks or nutritional assessment studies of genetically modified products, *Food Policy*, 2011; 36: 197–203

"Many farmland birds rely on seeds from weeds for their survival and the [UK] government's farm scale trials showed that GM beet and GM spring oilseed rape [canola] reduced seed numbers by up to 80% compared with conventional beet and oilseed rape. The commercialisation of GM beet and oilseed rape could be disastrous for birds. The government is committed to reversing bird declines and has promised to ban GM crops if they damage the environment. The Farm Scale Evaluations (FSEs) show that two GM crops harm the environment and ministers now have no choice but to refuse their approval."

— Dr Mark Avery, director of conservation at the UK's Royal Society for the Protection of Birds (RSPB) and member of the UK government's Science Review Panel, Jul 2003

happened on many occasions already".<sup>8</sup>

In late 2007, US company Scotts Miracle-Gro was fined \$500,000 by the US Department of Agriculture when genetic material from a new golf-course grass Scotts had been testing was found in native grasses as much as 13 miles away from the test sites, apparently released when freshly cut grass was caught and blown by the wind.<sup>9</sup>

In 2006, an analysis of 40 Spanish conventional and organic farms found that 8 were contaminated with GM corn varieties, including one farmer whose crop contained 12.6 % GM plants.

## Reliance on pesticides

Far from reducing dependency on pesticides and fertilisers, GM crops frequently increase farmers' reliance on these products. Herbicide resistant crops have not reduced chemical use as promised, and recent figures show that GM crop fields required over 26% more pounds of pesticides per acre than non-GM varieties.<sup>10</sup>

BT crops – designed to repel pests – have simply fallen victim to pest immune to the toxin. Herbicide resistant crops are now sprayed indiscriminately with weedkillers such as Monsanto's 'Round-Up' because they are engineered to withstand the effect of the chemical.

However, this means that significantly higher levels of herbicide are found in the final food product, and often a second herbicide is used in the late stages of the crop to promote 'desiccation' or drying, meaning that these crops receive a double dose of harmful chemicals.<sup>11</sup>

engineered to produce an insecticidal toxin, has never eliminated the use of pesticides,<sup>12</sup> and because the BT gene cannot be 'switched off' the crops continue to produce the toxin right up until harvest, meaning the food reaches the consumer with the highest possible level of pesticide residue.<sup>13</sup> BT maize, engineered to produce an insecticidal toxin, has never eliminated the use of pesticides,<sup>12</sup> and because the BT gene cannot be 'switched off' the crops continue to produce the toxin right up until harvest, meaning the food reaches the consumer with the highest possible level of pesticide residue.<sup>13</sup>

## "Frankenfoods"

Despite the best efforts of the biotech industry, consumers remain staunchly opposed to GM food. In 2007, the vast majority of 11,700 responses to the Government's consultation on whether contamination of organic food with traces of GM crops should be allowed were strongly negative.

The Government's own 'GM Nation' debate in 2003 discovered that half of its participants 'never want to see GM crops grown in the United Kingdom under any circumstances', and 96% thought that society knew too little about the health impacts of genetic modification.

In India, farmers' experience of BT cotton has been so disastrous that the Maharashtra government now advises that farmers grow soybeans instead.

Not long ago in Australia, over 250 food companies lodged appeals with the state governments of New South Wales and Victoria over the lifting of bans

“When you spray glyphosate on a plant, it’s like giving it AIDS.”

— Michael McNeill, agronomist and farm consultant, Aug 2011

“Over the past decade, corporate and government managers have spent millions trying to convince farmers and other citizens of the benefits of genetically modified (GM) crops. But this huge public relations effort has failed to obscure the truth: GM crops do not deliver the promised benefits; they create numerous problems, costs, and risks; and ... consumers and foreign customers alike do not want these crops.

“It would be too generous even to call GM crops a solution in search of a problem: These crops have failed to provide significant solutions, and their use is creating problems – agronomic, environmental, economic, social, and (potentially) human health problems.”

— National Farmers Union of Canada, Sept 2005

## Breeding resistance

Nature is smart, and farmers are increasingly seeing the emergence of ‘superweeds’ – plants which have evolved the ability to withstand the multiple doses of pesticides.

A report by then UK conservation body English Nature (now Natural England) in 2002 revealed that oilseed rape plants which had developed resistance to three or more herbicides were ‘not uncommon’ in Canada. The superweeds had been created through random crosses between neighbouring GM crops. In order to tackle these superweeds, Canadian farmers were forced to resort to even stronger, more toxic herbicides.

Similarly, pests (notably the diamondback moth<sup>16</sup>) have been quick to develop resistance to BT toxin, and in 2007 swarms of mealy bugs began attacking supposedly pest-resistant Indian cotton.

## Creating problems for solutions

Many of the so-called ‘problems’ for which the biotechnology industry develops ‘solutions’ seem to be notions of PR rather than science.

Herbicide resistance was sold on the claim that since crops could be doused in chemicals, there would be less need to weed mechanically or plough the soil, keeping more carbon and nitrates under the surface.

But a new long-term study by the US Agricultural Research Service has shown that organic farming, even

with ploughing, stores more carbon than the GM crops save.<sup>17</sup> BT cotton was claimed to increase resistance to pests. But in East Africa, farmers discovered that by planting a local weed amongst their corn crop, they could lure pests to lay their eggs on the weed and not the crop.<sup>18</sup>

## Health risks

Tests on animals exposed to GM crops give serious cause for concern. In 1998, Scottish scientists found damage to every single internal organ in rats fed GM potatoes. In a 2006 experiment, female rats fed on herbicide resistant soybeans gave birth to severely stunted pups, of which half died within three weeks. The survivors were sterile.

That same year, Indian news agencies reported that thousands of sheep allowed to graze on BT cotton crop residues had died suddenly. Further livestock deaths followed in 2007.

There have also been reports of allergy-like symptoms amongst Indian labourers in BT cotton fields. The only human trial of eating GM in 2002 found altered genetic material from GM soybeans not only survives in the human gut, but may even pass its genetic material to bacteria within the digestive system.<sup>19</sup>

In 2012 a widely publicised French study found multiple tumours in rats fed on a lifetime diet of GM maize.<sup>20</sup>

## Left hungry

GM crops have always come with promises of increased yields, but this has rarely been the case. A three-year

"The central theme is to placate the misinformed public opinion by using clever technologies to circumvent traditional unfounded criticisms of biotechnology."

— An article on the pro-GM Biofortified website, "Cisgenics – transgenics without the transgene", bluntly states the public relations value of cisgenics, Sept 2010

"One thing that surprised us is that US regulators rely almost exclusively on information provided by the biotech crop developer, and those data are not published in journals or subjected to peer review... The picture that emerges from our study of US regulation of GM foods is a rubber-stamp 'approval process' designed to increase public confidence in, but not ensure the safety of, genetically engineered foods."

— David Schubert, professor and head, Cellular Neurobiology Laboratory, Salk Institute, commenting on a comprehensive peer-reviewed study of US government's regulation of GMOs that he co-authored, Nov 2004

"The perception that everything is totally straightforward and safe is utterly naive. I don't think we fully understand the dimensions of what we're getting into."

— Professor Philip James, author of the "James" report on the structure and functions of the proposed UK Food Standards Agency to oversee national food safety standards, Director of the Rowett Research Institute, Aberdeen, Feb 1998

study of 87 villages in India found that non-BT cotton consistently produced 30% higher yields than the (more expensive) GM alternative.<sup>21</sup>

It is now widely accepted that GM soybeans produce consistently lower yields than conventional varieties. In 1992, Monsanto's own trials showed that the company's RoundUp Ready soybeans yield 11.5% less on harvest. Later Monsanto studies found some trials of GM canola crops in Australia actually produced yields 16% below the non-GM national average.<sup>22</sup>

## Wedded to fertilisers and fossil fuels

No GM crops have not reduced the need for chemical fertilisers in order to increase yields. Although much has been made of the possibility of splicing nitrogen-fixing genes into commercial food crops in order to boost yields, there has so far been little success.

This means that GM crops are just as dependent on fossil fuels to make fertilisers as conventional agriculture. In addition, GM traits are often specifically designed to fit with large-scale industrial agriculture.

Herbicide resistance is of no real benefit unless your farm is too vast to weed mechanically, and it presumes the farmers already farm in a way which involves chemical spraying. Similarly BT toxin expression is designed to counteract the problem of pest control in vast monocultures, which encourage infestations. In a world which will soon have to change its view of farming, GM crops will look like a relic of bygone practices.

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