

GM food controversy.



Image from: http://www.foe.co.uk/campaigns/real_food/issues/food_safety/

Instant Expert: GM Organisms

John Pickrell

New Scientist magazine, 04 September 2006

By far the most common genetically modified (GM) organisms are crop plants. But the technology has now been applied to almost all forms of life, from pets that glow under UV light to bacteria which form HIV-blocking "living condoms" and from pigs bearing spinach genes to goats that produce spider silk.

GM tomatoes, as puree, first appeared on British supermarket shelves in 1996 (a different fresh GM tomato first appeared in the US in 1994), but the consumer furore that surrounded GM technology did not erupt until February 1999. This was because a controversial study suggested that a few strains of GM potatoes might be toxic to laboratory rats. Those experiments, subsequently criticised by other experts, were carried out in Scotland by biochemist Arpad Pustzai.

What followed was a European anti-GM food campaign of near religious fervour. Spearheaded in the UK by environmental groups and some newspapers, the campaign would have far-reaching consequences. It culminated in an unofficial moratorium on the growth and import of GM crops in Europe and led to a trade dispute with the US.

GM crops are today very rare in Europe, strict labelling laws and regulations are in place for food (DNA bar codes), and public opinion towards the technology remains largely negative. Several UK government reports have offered qualified support for GM crops and produce, though they argue that the economic benefits of the technology are currently small. Some African nations have also opposed engineered crops, even to the point of rejecting international food aid containing them.

GM produce has been taken up with far less fuss in the US (where it does not have to be labelled), India, China, Canada, Argentina, Australia and elsewhere. However controversy over a type of GM corn - only approved for animal feed - which turned up in

taco shells and other products stirred opinion in the US.

Biotech revolution.

The human race has methodically improved crop plants through selective breeding for many thousands of years, but genetic engineering allows that time-consuming process to be accelerated and exotic traits from unrelated species to be introduced. But not everyone agrees this represents progress.

The root of genetic engineering in crops lies in the 1977 discovery that soil bug *Agrobacterium tumefaciens* can be used as a tool to inject potentially useful foreign genes into plants. With the help of that microbe, and other gene-implantation technologies such as electroporation, and gene guns, geneticists have developed a multitude of new crop types.

Most of these are modified to be pest, disease or herbicide resistant, and include: soya, wheat, corn (maize), oilseed rape (canola), cotton, sugar beet, walnuts, potatoes, peanuts, squashes, tomatoes, tobacco, peas, sweet peppers, lettuce and onions, among others. The bacterial gene Bt is one of the most commonly inserted. It produces an insecticidal toxin that is harmless to people.

Supporters of GM technology argue that engineered crops - such as vitamin A-boosted golden rice or protein-enhanced potatoes - can improve nutrition, that drought- or salt-resistant varieties can flourish in poor conditions and stave off world hunger, and that insect-repelling crops protect the environment by minimising pesticide use.

Other plants have been engineered to improve flavour, increase shelf life, increase hardiness and to be allergen-free (see also: hay fever-free grass). Geneticists have even created a no-tears onion to banish culinary crying, and novel caffeine-free coffee plants.

"Frankenfood" fears.

Critics fear that what they call "Frankenstein foods" could have unforeseen, adverse health effects on consumers, producing toxic proteins (and allergens) or transferring antibiotic-resistance and other genes to human gut bacteria to damaging effect. But there has been little evidence to back up such risks so far.

More plausible threats are that modified crops could become insidious superweeds, or that they could accidentally breed with wild plants or other crops - genetically polluting the environment. This could be a potentially serious problem if "pharm" crops, engineered to produce pharmaceutical drugs, accidentally cross breed with food varieties (or seeds become mixed up).

Large numbers of field trials, carried out by the UK government and others, reveal that gene transfer does occur. One 2002 study showed that transgenes had spread from US to traditional maize varieties in Mexico. A 2004 study revealed that conventional varieties of major US food crops have also been widely contaminated. Another study proved that pollen from GM plants can be carried on the wind for tens of kilometres.

Many experts agree that insect-repelling plants will also speed the evolution of insecticide-resistant pests. Normal crops are often grown alongside transgenic ones as

refuges for the pests, in an attempt to prevent their accelerated evolution into "superpests".

Environmentalists also argue that growing GM crops affects farmland biodiversity. Field trials to test for this have produced mixed results - some suggesting that GM crops actually boost biodiversity.

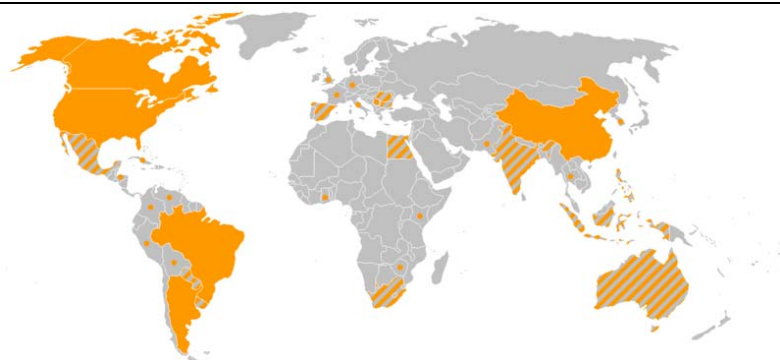
Growing globalization.

Genetic modification of crops may offer the largest potential benefits to developing nations. However, the growing globalisation of agriculture is a trend that worries some. Activists and disgruntled farmers worry that the agricultural biotech industry is encouraging reliance on their own-brand herbicide-resistant plants (Roundup Ready for example), which could create monopolies.

Companies such as Monsanto or Syngenta protect their GM seeds with patents. In one well-known legal case a Canadian farmer was successfully prosecuted for growing GM canola, though he claimed seed had accidentally blown on to his land.

Companies have also investigated technology protection systems. One type of TPS, dubbed the Terminator system by its critics, is a genetic trick that means GM crops fail to produce fertile seeds. This prevents the traditional practice of putting seeds aside from the crop to replant the following year, forcing farmers to buy new seed every year. However, some biotech companies have pledged not to use this technology, despite the fact it could be a useful tool in preventing genetic pollution. A clever genetic variation on that theme, the Exorcist system, allows the production of fertile seeds, but with any foreign GM DNA spliced out and destroyed. The GM revolution has not been restricted to crops. A small number of farm and laboratory animals have also been modified.

These include: quick-to-mature GM salmon, endowed with an early growth spurt, GM cows that produce casein-enriched milk ideal for cheese making, pigs bearing spinach genes that produce lower-fat bacon, goats engineered to churn out spider silk in their milk and mice that produce healthy fish oils.



World map GMO production 2005

Image from: http://upload.wikimedia.org/wikipedia/commons/f/f5/World_map_GMO_production_2005.png

Genetically modified crops: a decade of disagreement**Andy Coghlan****New Scientist magazine, 21 January 2006**

TEN years is a long time to be having the same argument. Yet a decade after genetically modified crops were first cultivated commercially, the debate over whether they should be grown at all still rages, with the two sides as far apart as ever. Coinciding with the anniversary, two surveys have revealed that many members of the public remain poorly informed about the issue.

It was in 1996 that GM crops became an industry, when cotton and maize engineered to be resistant to insecticides and soybeans resistant to weedkiller were grown for profit in significant quantities for the first time. Today some 8.5 million farmers in 21 countries grow GM varieties, according to an audit released last week by the International Service for the Acquisition of Agri-Biotech Applications, a non-profit organisation that promotes the use of biotech in developing countries.

Clive James, director of the ISAAA and author of the report, says there is now substantial evidence that GM crops are safe and benefit both the environment and millions of poor farmers. "The record is clear on food safety," he says. "Three hundred million people in the US and Canada have been eating it for 10 years with not even a hint of a problem." The report also finds that over the past 10 years the cultivation of crops modified to resist pests, such as Bt cotton, has meant farmers have applied 172,500 million tonnes less pesticide than they would have used on conventional crops. The major users and beneficiaries of GM crops are small farmers, the report claims. It says 9 out of 10 farmers growing GM live in developing countries.

But a report released by Friends of the Earth Europe contradicts these findings. It says that multinational companies such as Monsanto, which pioneered GM agricultural varieties, dominate the industry, and the planting of GM crops encourages monocultures that damage the environment and threaten the livelihoods of farmers who rely on conventional or organic varieties.

"Most people remain sceptical because the industry has failed to convince them there are benefits and it's safe," says Peter Riley of GM Freeze, a UK-based organisation campaigning for a continued moratorium on the cultivation and import of GM varieties in Europe.

Two recent studies show the public to be poorly informed about GM crops. A survey published this month in the *Journal of Rural Studies* (vol 22, p 29) questioned people known to be strongly opposed to GM technology or to be anti-GM activists. It found that 17 of the 38 people questioned believed growing Bt crops does not lead to a reduction in the amount of pesticide sprayed. Yet the overwhelming evidence indicates that farmers growing these crops do use less pesticide (*New Scientist*, 7 May 2005, p 11).

Another survey, released in November 2005 by the Pew Initiative on Food and Technology, a charitable trust based in Washington DC set up to encourage public debate on biotechnology, revealed that almost 6 out of 10 adults in the US are unaware that GM

crops exist, while only 25 per cent realise that GM foods have been on sale in the US for the past 10 years. When further informed about the pros and cons of GM foods, more than 6 out of 10 respondents said they would oppose the importation of GM crops into the US.

“Only 25 per cent of adults in the US realise that GM foods have been on sale in the country for the past 10 years” Meanwhile the uptake of GM plants continues apace. Last year saw Iranian farmers plant the first variety of GM rice, which contains an insecticidal toxin to keep pests at bay.



GM food in Estonia

Image from: http://www.eko.org.ee/gmo/index.php?option=com_content&task=view&id=22&Itemid=32

US citizens ignorant of genetically modified diet

New Scientist magazine, 16 December 2006

DESPITE having consumed genetically modified food in their cookies and apple pies for the best part of a decade, most Americans still don't know they're routinely eating the stuff.

A poll of 1000 US citizens published on 6 December reveals that only a quarter realise they're eating GM food, and 60 per cent have no idea it's in their diet.

“60 per cent of Americans have no idea they are eating genetically modified food” “It's not completely off the radar, but it's not at the top of the mind for US consumers, and never has been,” says Michael Fernandez of the Washington DC-based Pew Initiative on Food and Biotechnology, which commissioned the survey. Public ignorance might be down to the fact that most GM material is effectively hidden, he says. It may be present, for example, as soybean lecithin or maize syrup in cookies, without labelling.

So what would it take to increase awareness? As always, a good food scare. The unexplained presence of GM material in imported food, for example, would play on people's prejudices, says Fernandez.

Editorial: Export as you would be exported to...

New Scientist magazine, 19 November 2005

THE genetically modified chickens are coming home to roost. Having spent the past decade insisting that it should be free to export GM crops and foods derived from them, the US is waking up to the possibility that it may soon be asked to accept imports of

similar GM material from other countries, such as China and Argentina, which are now producing more than they consume.

This month, the issues raised by this hitherto remote possibility were discussed in Washington DC at a seminar held by an independent think tank, the Pew Initiative on Food and Biotechnology. The US is shockingly unprepared. As things stand, anyone wishing to bring a GM product into the country will need to notify the authorities only if it is intended for planting on US soil. Anything else can sail through without any of the mandatory pre-marketing scrutiny demanded in Europe.

Delegates had lots to discuss. How will US consumers react if foreign farmers start sending shipments of GM rice, soy and other commodities? Are new regulations needed to safeguard health and the environment? What if GM seeds intended for consumption rather than planting spill onto US soil? And what if US consumers do not want to eat foreign GM produce?

These and a host of other questions will need some adroit answers from the politicians and business people who have slammed Europe for its "irrational" aversion to GM. They will have to tread a careful path to avoid accusations of hypocrisy once those chickens start to arrive.



Image from: <http://www.bio.davidson.edu/people/kabernd/seminar/2004/GMevents/NH/NH.html>