



GMOs...why all the fuss about genetically modified organisms?

Genetically engineered foods are being sold as the answer to the world's famine problem, but are they as safe and as environmentally healthy as the scientists and salesmen would have us believe? Or as dangerous as the environmental activists claim...? Here are the facts so that you can make informed choices when shopping for friends and family.

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Genetic modification (GM), genetic engineering (GE) and transgenic technology are different terms for the same basic process. This technology allows scientists to take genes from the DNA (the chain of molecules governing all the body's structures and processes) of one organism and splice them into the DNA of another. This changes the way the second organism develops, creating new variations or types of plant or animal.

Plant and animal breeders have been cross-breeding and hybridising to enhance certain characteristics of their chosen species for centuries. The difference between this conventional method of breeding and the new genetic technologies is that, using natural methods, species have not been able to exchange genes between unrelated organisms, i.e. from an animal to a plant. (In the USA, genes taken from fish have been spliced into plants – a gene for cold tolerance to protect against frost.) (1). Traditional breeders mated two animals of the same species with desirable characteristics to produce offspring with those same characteristics enhanced. Scientists are now able to take a desirable characteristic from any organism and create new types of plants and animals with that desired quality.

What are the benefits of GE?

Traditional methods of plant and animal breeding are often successful, but they are by their very nature a slow and relatively unpredictable way of achieving the desired effect. Genetic modification, however, is a way of accurately extracting the gene controlling that desired effect and adding it to an organism. GE has the same aim as natural cross breeding but is many times more precise (you don't get a whole lot of other characteristics along with the single desirable one you do want, as you would with natural hybrids). A variety of GM potato has been bred incorporating DNA from a bacterium which makes it poisonous to the pest Colorado beetle. Farmers growing the variety will no longer need to spray with chemical pesticides (though they may find their potato plants labelled as pesticides!).

Crops can also be adapted to many different farming conditions and methods of growing through the addition of genetic material allowing higher yields and greater nutritional value. This will mean that GMOs could supply new sources of food where it is most needed – a new rice variety with increased vitamin A and iron content is currently being trialled for cultivation in South East Asia.(2)

Genetic engineering has many applications in medicine as well as food production, particularly for the prevention and even cure of inherited diseases, but there isn't room to discuss them all fully in this tipsheet.

What are the potential dangers of genetic engineering?

The potential dangers of GMOs in the food chain (from animal feed to soya oil to insect resistant potatoes fried by a fast-food restaurant) are a matter of much debate. The new technology is introducing into the food chain genes from organisms which have never been eaten before – by people or animals. There simply hasn't been enough time since the new technology was introduced to tell whether or not

these new genes in food will affect their consumers over one or more lifetimes. There is widespread concern that the new genes could cause allergic reactions or other more long term health problems. In the UK independent Government research will not produce its results until 2001(3) and yet products including GE material are already on sale in the shops. The problems caused by animal protein being fed to cows (which in nature never eat animal proteins, only plant material), leading to the development of BSE and new variant CJD in humans, are a good reason to be cautious about any new technologies involving the food chain.

Another problem that may stem from widespread use of GMOs is the threat to biodiversity – biodiversity is dependent on retaining as many variations of organisms in the world as nature has evolved since the beginning of time. Variety in agriculture is desirable for all sorts of reasons, from protection against disease to adaptation to climate and freedom of choice. Seeds with GM genes are now patented – which means that the company that sells a farmer seed retains an interest in that seed. For years, small farmers and individual gardeners have been cultivating crops and saving seed from those crops for use the following year. In future, anyone saving seed from patented crops and growing for a second year without paying the original seed supplier could be breaking the law. To protect their interests, a number of the companies who supply patented seed have developed genes that make their crops infertile (you may have read about these 'terminator' genes in the press) so that there would be no seeds for farmers and gardeners to save. However, over one billion of the world's poorest people rely on farm-saved seed for their food. (4) Eventually, a few multinational companies could end up dictating what the entire world eats.

Breeding plants with genes that make them resistant to pests – that makes them insecticides – also threatens biodiversity. Any natural predator – for example, the ladybird who eats aphids – will be ingesting the insecticide that has originally been designed to kill the pest and so on up the food chain. Soon to be sold commercially are crops such as oilseed rape (which is sold as Canola oil), sugar beet and maize (sweetcorn) which have genes that make them resistant to weedkillers. Fields of such crops sprayed randomly with herbicides will stay alive whilst all other plants will die off. When all the wild plants in the fields are killed, the many insects and birds that feed on them will be unable to find food. English Nature (the Government's wildlife advisor) warns that the introduction of weedkiller-tolerant crops 'could be the final blow for species like the skylark, the linnet and the corn bunting'. (5)

The new weedkiller-tolerant and insecticidal plants may also prove able to breed naturally with similar species. There is no consistent proof that pollen from fertile GMOs will not be carried by pollinators like bees to fertilise wild or conventionally bred plants. If this happens the GMOs may out-compete all other plants, diminishing biodiversity. It will also reduce consumer choice as no farmer using organic methods will be able to guarantee that his crops do not contain GM material – the bees may bring it whether he likes it or not.

What's in it for me?

- The seed companies promise cheaper food in the shops thanks to greater productivity on the farm
- The producers of GMO products claim that they are working towards ensuring a more sustainable form of agriculture requiring less chemical use after planting
- The potential for foods which aren't just foods, but medicines
- Plants designed to produce the most desirable form of french fry or the unblemished potato crisp
- The reduction of choice – fewer crop varieties and no organic alternatives
- The potential for unseen health complications, e.g. allergies to new foodstuffs

What's in it for others?

- The multinational chemical and GE companies will be in receipt of huge amounts of income from farmers using GMO seeds requiring complementary pesticide and herbicide use
- The promise of enhanced crops for difficult growing conditions or to specific nutritional requirements
- While scientists claim GMO crops may hold the potential for feeding the world's poor, the majority of GE crops are used for feeding animals destined to be food for the West
- Third World farmers will have to pay for seed annually that once would have been a one-off capital expense
- Seed companies are likely to demand higher prices for 'enhanced' GE seed

What about testing?

The problem with testing the safety of GMOs is that field trials necessarily expose the outside world to new genetic material. There is substantial argument about, for example, the spread of pollen from fertile GMOs. Oilseed rape pollen can travel over 2.5 km, sugar beet over 3 km and maize pollen has been known to travel several kilometres. Once contamination takes place, there is little at present that can be done to contain it. Should problems emerge from testing, it may prove impossible to stop those problems multiplying. In human terms, although the GM companies have as yet found little to indicate adverse reactions, the period of testing is still in its infancy and, for example, it took several years before the use of thalidomide was proved to be harmful to unborn babies. The counter argument runs that testing is required so that informed choices as to future research and regulation can be made both by the companies developing the products and by Government authorities overseeing legislation.

How to spot a GMO...

Under EU rules GE foods must be labelled. However some products derived from GE foods – oils and additives for example – do not need to be labelled, nor do some processed foods such as pre-cooked meals. This means that spotting GMOs for effective labelling requires every ingredient of a product to be traceable to its source. In effect, the regulations may exclude 95-98 per cent of products containing GM ingredients. It is almost impossible for the average consumer to spot GMOs in all their foodstuffs.

What to do if I want to avoid GMOs...

- Buy organic: certified products do not contain GMOs and are clearly labelled. You can buy organic foods at the best prices by joining your local organic vegetable box scheme, or by buying organic produce from your nearest Farmers' Market. There are seven certification bodies approved by the UK Register of Organic Food Standards, the best known of which is The Soil Association.
- Do it yourself: home made foods are more under your control, and therefore likely to be healthier, than factory made equivalents. Grow vegetables from organic seed and avoid using chemicals in cultivation. Find out more about organic gardening through the Permaculture Association, the HDRA at Ryton in Coventry, or CAT (our mail order bookshop has a number of relevant titles). Buy local cheeses, traditional regional foods and locally produced organic meat and vegetables to help ensure that your choice of foods remains as wide as possible.
- Make your views known: demand GM-free food – ask supermarkets, shops and restaurants for a guarantee that the foods they sell are free of GM ingredients and avoid those which promote GMOs. Be sure to ask them to confirm that their products contain 'no genetically modified ingredients or ingredients derived from GM-organisms' – remember that legislation does not cover derivatives like lecithin, rennet, amylase and pepsin. Write to your MP and MEP and the Minister for the Environment, telling them that you object to the importation of GM foodstuffs and the growing of GM crops in this country.

Where can I find out more?

Remember that knowledge is vital for informed choice, so find out as much as you can about the questions that concern you now that you know the basics!

To help you find out more, CAT's Information Service has compiled the following contact list:

Growing Organic Foods:

- *The Soil Association* is running an intensive GMO campaign, gives organic accreditation and has definitive advice on organic growing. Tel: 0117 929 0661 <http://www.soilassociation.org>
- *Henry Doubleday Research Association* Tel: 01203 303517 <http://www.hdra.org.uk>
- *The Permaculture Association* Tel: 07041 390170 <http://www.btinternet.com/~permaculture.uk>
- CAT's website includes a comprehensive list of books on organic vegetable growing and our comprehensive *Organic Gardening Resource Guide*. <http://www.cat.org.uk>

Buying Organic Foods:

- *The Soil Association* (see above) has produced *Where to Buy Organic Foods*, a directory of everything organic including farm shops, box schemes & retailers.
- *National Federation of City Farms* Tel: 0117 923 1800
- *Suma Wholefoods* Tel: 01422 345 513
- Your local authority for details of Farmers' Marts.

Publications:

- *GM-Free* magazine Tel: 01695 50504
- *Natural Products News* and *Health Food Business*, two wholefood trade publications, both carry regular features on the issues.
- Several magazines have produced special editions devoted to the GM issue including *The Ecologist* (Sep/Oct 98) and *Resurgence* (May/June 98).

Web Sites:

- *Friends of the Earth*: <http://www.foe.co.uk>
- *Genetic Engineering Network*: <http://www.dmac.co.uk/gen.html>
- *Greenpeace*: <http://www.greenpeace.org/~geneng/index.html>
- Information & reading: <http://userwww.sfsu.edu/~rone/gedanger.htm>
- Who's Doing What: <http://www.connectotel.com/gmfood>

In Support of GMOs:

To gain a balanced viewpoint you can access information that supports GM. Take a look at Monsanto's website for information and a chance to join in their discussion groups!
<http://www.monsanto.com>

Footnotes

- 1) *Playing God in The Garden*, Michael Pollan, 1998
- 2) Professor Derek Burke, *Feedback* magazine, 1999
- 3) *Genetically Engineered Food Briefing Sheet*, Friends of the Earth, 1998
- 4) *Op Cit*: Friends of the Earth, 1998
- 5) *Op Cit*: Friends of the Earth, 1998