



The GM Public Debate

May 2003

Greenpeace position on GM

Greenpeace opposes the release of genetically modified (GM) crops into the environment. GM crops pose unpredictable and irreversible long-term risks to environmental and human health. GM crops are new life forms that have never occurred in nature, created by a technique that allows scientists to insert foreign genes into random positions in the DNA of a host. GM enables scientists to bypass natural selection and evolution by transferring genes from species that would never normally breed together. Once these self-replicating man-made organisms are released into the environment and the food chain there is no way of recalling them and no one knows what the long-term effects of GM crops on the environment or our health will be.

Greenpeace position on the debate

Greenpeace campaigns against GMOs to protect the environment, our food and the communities dependent on these. However, the current debate process simply does not help meet these requirements. There has been a public GM debate in the UK since 1998 but we have major doubts over the Government's current commitment to a public consultation that incorporates public concerns. Government has never said that they would ban GM crops in the UK following the outcome of this debate. They have never even committed to it making any difference to the decision making process. Unless this happens, the debate is pointless. The Government's public debate will be made up of 6 "regional debates" and a further (though currently unspecified) number of smaller debates run by local councils and interested members of the public. However the debate has not been properly funded and should include other elements - expert academics in this area say a debate like this should include events like citizen's juries and consensus conferences. The results of the real public debate, however, are absolutely conclusive - no one wants to eat GM foods or grow GM crops.

Key issues

Different people oppose GM for different, but absolutely valid reasons. These reasons include ethics, environmental concerns and worries over what GM will do to the food production system. Together they create unanswerable questions about GM. However, Greenpeace believe there are 3 major points:

- GM crops will give no benefit for you, the environment or farming.
- There are a huge number of complex reasons for rejecting GM crops.
- Together, these make a compelling case for rejecting GM crops and food.

Other points to mention:

- We don't want GM - it poses very real and irreversible long-term risks to human and environmental health.
- GM is not traditional breeding and the consequences of transferring genes in this way are not fully understood and the technology currently used to genetically modify living organisms such as plants or animals is crude and imprecise.
- There are important issues, like liability and coexistence, which Government isn't properly addressing. Rigorous legislation for these must be in place before Government makes up its mind on GM commercialisation.
- The timing and information given out by the Public Debate has been very poor.
- The real public debate on GM has been going on for the last 5 years and the results are very clear - people don't want GM.

Areas of concern

1) Environmental damage

Greenpeace believe GM crops pose irreversible long-term risks to the environment. It is possible that GM crops to transfer modified genes to closely related plant species. Because pollen and seeds can be carried huge distances by the wind and insects, it means that GM crops can pollinate with other crops over huge distances. This is particularly worrying because GM oilseed rape and sugar beet have wild relatives in the UK - any contamination of these wild species would be irreversible. In addition, non-gm and organic maize or oilseed rape crops could be contaminated.

A recent study by the European Environment Agency¹ confirmed the risk of massive contamination should GM crops be commercialised, showing that:

- "At farm and regional scale gene flow can occur over long distances and therefore complete genetic purity will be difficult to maintain."
- "Oilseed rape is cross compatible with a number of wild relatives and thus the likelihood of gene flow to these species is high."
- "It is predicted that plants carrying multiple [herbicide] resistance genes will become common post-GM release."
- "Volunteers (weeds in the following year's crops) may become more difficult to control with herbicide treatments."

A more recent study by the UK Department of Environment, Food and Rural Affairs came to very similar conclusions. The report², published on Christmas Eve 2002, looked at trials of GM oilseed rape and concluded that:

- "If GM oilseed rape is grown on a large scale in the UK, then gene flow will occur between fields, farms and across landscapes."

- Seed spillage and failure to clean combine harvesters is likely to be a significant source of GM contamination.
- GM oilseed rape volunteers survived for at least four years.
- Wild oilseed rape growing close to crop fields was contaminated.

Genetic contamination of non-GM and organic crops by GM varieties has already happened in Canada. According to a study by English Nature³, so-called "superweeds" have started growing that are tolerant to three widely used herbicides when genes from separate GM varieties accumulate (called "gene stacking") in plants that grow from seed spilled at harvest ("volunteer plants"). The problem starts when one type of GM oilseed rape pollinates another, causing gene stacking and multiple herbicide tolerance. When seed is spilled at harvest, it remains in the ground and germinates later as unwanted weeds in crops of different species. These superweeds will be very difficult to eradicate - greater use of more powerful herbicides, especially in places like field margins where weeds tend to grow and can be important refuges for wildlife, could be very damaging.

The problem of contamination is especially significant in the UK because wild relatives of two of the crops being grown in the Farm Scale Evaluations live naturally in the UK. Wild relatives of oilseed rape and sugar beet include Wild Turnip (*Brassica rapa*) and Sea Beet (*Beta vulgaris maritima*).

2) Health

We have no way of knowing if GM foods really are safe to eat. Because genetic modification involves the random insertion of genes from one organism into another, this may result in completely unexpected or unintended results. The possible disruption of genes in this way could lead to the creation of new toxins or allergens - but these may only be discovered years after the GM food has been sold. If antibiotic resistance "marker" genes are used in the creation of GM crops they may increase problems like drug resistance. Despite these possible dangers, there has been no study of the long-term risks of eating GM foods for humans. How can people say for sure that they are safe?

Current testing of GM foods is based on a strange concept called "substantial equivalence". If a GM food can be shown to be "substantially" similar to the same non-GM food then it is assumed that it will pose no new health risks and be safe to eat. This might be an attractively simple and cheap concept for GM companies desperate to get their products on the market as soon as possible, but it raises a number of very serious issues for the public.

Rather than testing new GM foods in the same way as new pharmaceutical products, basing safety on substantial equivalence means that GM companies do not have to run long and expensive testing programmes on their products. It means that important immunological, biochemical or toxicological tests, or even long-term human feeding trials do not have to be done. In addition, this testing is done by the GM companies themselves and is rarely published or peer reviewed. Using substantial equivalence for GM foods is like pretending

to have adequate information to decide that they are safe. It provides GM companies an excuse for not requiring detailed scientific assessments and means that potentially dangerous long-term health problems might never be picked up.

It is important to remember that the number of scientific investigations into possible health risks that have not been funded by the GM industry are practically zero. Consequently the information we are given is not really impartial. Some of these health problems might include:

Toxicity - When a GM crop is developed to make it resistant to herbicides or insects new genes must be inserted to give the plant this resistance. This means that the new plant must be tested to see if it is safe for people, but testing is only ever done on laboratory animals. These animals can often detect rapid effects but might not be able to identify long-term or subtle health effects on humans.

Allergies - Allergies to foods are becoming increasingly common. GM crops produce entirely new compounds that have never occurred naturally before and it is quite possible that these compounds could cause unexpected allergic reactions in people. It often takes many years for food allergies to become recognised and although we know that many people are allergic to foods like peanuts or dairy products, most GM ingredients are used in highly processed foods. This would make it almost impossible to work out exactly what GM food is causing the allergy.

Antibiotic resistance - Antibiotic resistance genes are used as "markers" in GM crops to show whether a new gene has been successfully incorporated into the plant. An antibiotic resistance gene is included in the genetic package inserted into the plant. If the process is successful, the plant will grow in the presence of the antibiotic - otherwise the plant will die. Antibiotic marker genes themselves do not have a function in the GM plant, but if they are transferred to disease-causing organisms they may compromise the treatment of illnesses with antibiotics in the future. The antibiotic resistance genes could be removed, but this costs more money. However, both the House of Lords and the British Medical Association have called for a ban on their use.

3) Coexistence

Can GM and non-GM farming coexist together in the UK? Greenpeace believes that the clear environmental problems posed by GM crops, especially cross-pollination, mean that the contamination of conventional and organic crops by GM varieties will be inevitable if commercialisation goes ahead. However, the critical question of coexistence is one that Government has not adequately considered at the moment. It is clear that if GM crops are to be grown commercially there must be safeguards put in place before growing to minimise genetic pollution - and to protect consumer and farmer choice to eat and grow non-GM and organic foods.

A study by the European Commission's Joint Research Centre⁴, which was originally meant to be secret but was leaked to Greenpeace, found that non-GM farmers would face increased costs if GM crops were commercialised. These costs include paying more for certified GM-free seeds and maintaining product purity. It estimated that in some cases these costs would be unsustainable. Specifically, the report found that:

- Commercialisation of GM oilseed rape and maize would increase costs of non-GM and organic farmers by between 10 - 41%.
- Coexistence of GM and organic farming would be impossible in many cases.
- If commercialisation went ahead, all oilseed rape and maize seed stocks and products would become contaminated with GM to some extent.

Government has to consider various technical and social questions around coexistence:

- Pollen can move over a massive area, meaning that huge distances will be needed between GM and non-GM crops to prevent contamination from happening.
- GM contamination must not be accepted in non-GM and organic crops above the level of detection (currently 0.1%).
- Any co-existence systems must be enforced by law and not be regulated by the GM industry.

A leaked report by the Government GM advisory commission, the AEBC, said that "be difficult and, in some places, impossible to guarantee" that any food in the UK would be GM-free if commercial growing of GM crops went ahead.⁵

4) Liability: who should pay if things go wrong?

While the GM industry is very keen to get GM crops into the UK, it absolutely refuses to take any responsibility for any possible harm that GM could cause - harm to organic and conventional farmers or even to the environment. At the moment there is no law that requires GM companies pay compensation to farmers affected by GM contamination or to clear up environmental damage. But if GM companies are so sure their products are absolutely safe, why won't they accept liability for them?

GM companies, who stand to gain most from releasing GM crops with long-term, unpredictable and irreversible environmental effects, refuse to recognise the risk that damage might take place and to take responsibility for any problems that could occur.

Because GM crops pose a series of unique risks, they are unlike any other form of pollution. We still know very little about the long-term risks of releasing them into the environment, but as living, self-replicating organisms GM crops will be impossible to contain or clear up.

There are 3 types of harm that could arise from GM crops:

1) Environmental damage

When people are asked what about GM crops worries them most, an increasing number say the long-term unpredictable effects on the environment. Yet if the Government approves a GM crop and damage is caused unexpectedly, society will have to pay the cost of putting things right. GM companies or GM farmers do not have to pay a penny. Is this fair?

Given that we know environmental damage from growing GM crops in the UK will be inevitable, should GM companies be made liable for this? How could this be done? There are some important questions on liability that the Government must answer before they decide on whether to allow GM commercialisation, but which they seem unwilling to do:

- How do you assess what "environmental damage" actually is?
- How do you quantify this?
- Is it possible to put a price tag on irreversible environmental damage?
- How do you repay the public?

Greenpeace believe that the genetic contamination of wild relatives of some of the GM crops being tested in the UK would constitute irreversible environmental damage. As it is impossible to quantify or effectively "clean up" environmental damage from GM crops, releasing them is unacceptable. Especially when GM companies refuse to acknowledge the risk their products pose, or accept liability for any damage that they might cause.

2) Economic damage

Organic products are not allowed to have any levels of GM in them, and normal food is only allowed a very small amount (0.9%). If GM crops are grown, organic and conventional crops could be contaminated, meaning that farmers might not be able to sell their products. Is this fair? At the moment, if this were to happen the affected farmer would not be able to claim compensation. In contrast, if a GM farmer found that a crop did not grow properly, they would be able to claim compensation through their contract with the GM company

3) Damage to health

What happens if in the future people become sick from eating GM foods? Should GM companies pay? Under the Consumer Protection Act they can do, but being able to prove that a specific GM food caused harm will be almost impossible. In addition, GM companies could argue that they followed all UK laws in place when the GM crop was grown and based on the knowledge available the product was considered safe. Is this acceptable?

Other points to consider:

- Strict laws covering all aspects of liability should be in place before GM crops can be grown.
- Society should not have to pay for any unexpected effects from GM.
- Should farmers and GM firms have compulsory insurance for any environmental or economic damage caused by growing GM crops?

5) Unpredictability of GM

GM is by no means a precise technology and scientists have no way of controlling precisely where new genes are placed among the host plant's DNA. This could be a recipe for disaster - especially if normal genes are disrupted or if foreign genes do not function properly. This in turn could affect the chemical composition of the plant and the safety of any food made from it. It is only recently that safety testing for GM foods has considered these unexpected effects, but the techniques used to work out what they might be are still not properly developed.

6) Agriculture in the UK today

GM crops fit in perfectly into the current model of chemically intensive farming that nobody is happy with. Lots of organisations and individuals are supporting agriculture that works with nature rather than "succeeding" suppressing and dominating natural ecological processes. The strongest and best example of this is organic farming - whose existence could be threatened by GM crops.

7) Science base of GM is not balanced

Much of the scientific research on GM crops is either done by the GM companies themselves or by scientists who are in some way funded by the GM industry. For example, the risk assessments for the safety of GM crops come from the very companies trying to get GM products approved, and we are increasingly seeing that corporations are setting the parameters for GM research in universities.

8) Things are already going wrong

Despite promises from the GM industry that contamination problems with GM crops would never happen, the truth is somewhat different. In recent years a worrying amount of these contamination scandals have been discovered - GM crops have contaminated non-GM crops, polluted non-GM seeds, have been grown illegally and in some cases ended up in the food chain. The worryingly lax response from the UK Government to these GM contamination incidents does not bode well for the future. The Government has never adequately punished the GM industry when they have broken the law and contaminated other crops. Letting them off so lightly sends out the wrong message and

unless Government changes its attitude, organic and conventional farming could be threatened in the future.

Recent contamination incidents include:

StarLink

In 2000 a variety of GM maize called StarLink, designed by GM company Aventis as an animal feed and not permitted to be fed to humans, was found to have contaminated taco shells and corn chips in the USA. Testing found that 1% of the maize used in these products was StarLink and subsequently contaminated foods were discovered as far away as Japan. The US Government had not given StarLink approval as a human food because of concerns that it may trigger allergies in some people and over 300 food brands were recalled from supermarket shelves. Kraft, one of the makers of the tacos recalled all of its taco products in the entire USA and the controversy forced Kellogg's to shut down production lines for almost two weeks to make sure there was no StarLink in their system. Aventis was forced to buy the entire 2000 StarLink harvest in the USA to ensure that no more contamination occurred. The cost of doing this was at least \$100m. Once possible lawsuits are finished, it is estimated that the total cost to Aventis could be closer to \$1 billion.

How did this incident happen? GM companies continually say that there is no way that GM crops or foods will get mixed up with non-GM supplies, yet StarLink showed that they could. Some American farmers said they were not told that StarLink must be kept separate from other crops because it was not approved for human food. Others said that while they were told that StarLink had not been approved for human consumption, they were also informed that approval was expected shortly - which was not true. Hence, StarLink was mixed in with other maize and shipped to food companies.

ProdiGene

In November 2002 \$3 million worth of soya beans in the USA were destroyed after it was discovered they had been contaminated with GM maize seeds. The incident occurred because the soya was planted on the same site used to grow GM "pharmaceutical" maize by a GM firm called ProdiGene in 2001. Seeds dropped by the maize grew in 2002 and contaminated the new soya bean crop, which was harvested and stored prior to being sent to food companies. The US government realised that contamination occurred and ordered the soya beans to be destroyed.

Scientists can genetically engineer plants to grow proteins for use in medicines for humans and animals, but these plants are not intended for human food use. ProdiGene's GM pharmaceutical maize was designed to create a vaccine for pigs - the company received a \$250,000 fine and were forced to buy back all the contaminated soya beans at a cost of \$3 million.

Advanta seed contamination

In May 2000 conventional non-GM oilseed rape imported from Canada and sold in the UK, France, Germany and Sweden by seed company Advanta was found to be contaminated with GM oilseed rape. Hundreds of British farmers sowed nearly 15,000 hectares with this GM-contaminated seed that was not approved by the Europe Union for release into the environment. Rather than immediately ordering the destruction of the contaminated crops, the Government only told farmers to dispose of them after harvest - allowing the possible contamination of non-GM and organic oilseed rape and wild relatives to take place in the process. Farmers in France were ordered by the Government to destroy their crops immediately. Advanta claimed they were innocent of any wrong doing, but farmers were urged by Government to take legal action. Eventually Advanta compensated the farmers involved but amazingly the Government decided not to impose any fines on the company.

It seems likely that GM crops cross-pollinating their non-GM neighbours originally caused the contamination in Canada. As the nearest GM crops were at least 800 metres away this raises questions over the effectiveness of separation distances between GM and conventional crops - particularly in the UK, where the current separation distances are only 50 metres for oilseed rape. This shows the risk that GM crops pose to conventional and organic farmers.

Aventis Farm Scale Evaluation contamination

Further evidence that biotechnology companies are unable to manage the release of GM crops in the UK came to light in August 2002. It was revealed that all of the GM oilseed rape trials run by GM company Aventis (now Bayer) as part of the Farm Scale Evaluations had been contaminated with an unapproved GM oilseed rape variety. The unapproved variety, resistant to the herbicide Liberty, also contained a gene that confers resistance to the antibiotics neomycin and kanamycin and had been grown for over 3 years without being noticed. This was despite the Government's own GM inspectorate visiting Aventis in the spring of 2002 and checking for possible contamination. In fact, the contamination was only discovered by a small Scottish agricultural college.

No one knows how the two GM varieties became mixed up, but Government advisors described it as "a serious breach of regulations." However the Government then decided to allow the contaminated crops to be harvested as normal, claiming that the unapproved variety posed no risks to human health or the environment. Both the House of Lords and the British Medical Association have called for a ban on the use of antibiotic resistance genes in GM crops as the risk to human health from antibiotic resistance developing in micro-organisms is so great. Aventis employees could face up to 5 years in jail and unlimited fines, but it is doubtful if the Government will take any action against the company. This whole incident shows that GM companies have shown they cannot even run a series of small trials properly - who knows what mistakes they will make if they ever get the chance to grow GM crops commercially.

Current market position on GM

Consumers remain overwhelmingly against GM foods - in response, all the major UK supermarkets and food companies have reiterated their commitment to keep GM ingredients out of their own brand products. A recent MORI poll for The Independent newspaper found that opposition to GM crops and food in the UK remains formidable. The poll showed that opponents of GM continue to outnumber supporters solidly, by four to one, with 56% of the population against, and only 14 % in favour. Among women the figures are even starker, at six to one, with 61% against and only 10% in favour. These findings led MORI to comment that "the widespread extent of the opposition is surprising...If the Government thinks that people are coming round to GM technology, this clearly shows that the opposition to it is still remarkably stable."

Conclusion

Government is asking the wrong questions about GM in this public debate - they simply want to know how to justify commercialising GM crops. Government should really be asking what we want from our agriculture and how we go about getting it - the answer to this question would be through sustainable agricultural systems. Not GM crops.

¹ *Genetically modified organisms (GMOs): The significance of gene flow through pollen transfer*. European Environment Agency, March 2002 http://reports.eea.eu.int/environmental_issue_report_2002_28/en

² *Monitoring large Scale Releases of Genetically Modified Crops (EPG 1/5/84) Incorporating Report on Project 1/5/30: Monitoring Releases of Genetically Modified Plants*. DEFRA, December 2002 <http://www.defra.gov.uk/environment/gm/research/epg-1-5-84.htm>

³ *Gene stacking in herbicide tolerant oilseed rape: lessons from the North American experience*. English Nature, February 2002 <http://www.english-nature.org.uk/pubs/publication/PDF/enr443.pdf>

⁴ *Scenarios for the coexistence of genetically modified, conventional and organic crops in European agriculture*. EC Joint Research Centre, May 2002 http://www.jrc.ec.eu.int/download/gmcrops_coexistence.pdf

⁵ *Eco soundings*. Guardian, 30th April 2003 <http://society.guardian.co.uk/societyguardian/story/0,7843,945802,00.html>