GM Contamination Register
Report 2007

Annual review of cases of contamination, illegal planting
and negative side effects of genetically modified organisms

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The question mark has been used by Greenpeace in GE-crop fields around the world to highlight the lack of information concerning genetically modified organisms © Greenpeace/Gustavo Graf

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GM canola trial – Australia
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This is the third report from the online GM Contamination Register (www.gmcontaminationregister.org). It reviews reported cases of contamination and illegal plantings and releases of GM (genetically modified) organisms since GM crops were first grown commercially on a large scale in 1996. This compilation likely represents a fraction of the actual cases of GM contamination that have taken place, for many cases either cannot be detected or are not revealed to the public. Despite widespread concern about negative impacts on the environment and possible risks for human health, ***there is still no global monitoring system for GM contamination.***

Contamination threats are not limited to the errant genes of commercially approved varieties of maize and soybean. The 'next generation' of GM crops, designed to produce drugs or industrial products such as plastics, are now being widely grown in experimental trials, with possible serious implications for human health should they contaminate the food chain. As we highlight in this report, contamination incidents from field trials occur on a regular basis, yet there is neither systematic official testing nor publicly available information to enable the presence of such crops to be detected in the food chain.

1.1 Global GM contamination continues

The GM Contamination Register was started by GeneWatch UK and Greenpeace International in 2005, in an attempt to address the failure of international agencies to monitor contamination. It contains records of:

- **contamination incidents** – when food, feed or a related wild species have been found to contain unintended GM material from a GM crop or other organism. These are included when there is evidence from laboratory testing that GM contamination has occurred;
- **illegal plantings or releases of GM organisms (GMOs)** – when an unauthorised planting or other release into the environment or food chain has taken place. These cases are included when there has been official acknowledgement that rules on the release of GMOs have not been followed;
- **negative agricultural side-effects** – when there has been a report in the scientific literature of agricultural problems arising from the GMO and how it is managed.

In 2007, 39 incidents were added to the register. In addition, changes to the reporting format and the discovery of new cases led to the addition of 1 case for 2003, 2 cases for 2005 and 32 cases for 2006 bringing the total number of incidents recorded in the database to 216.

The 28 incidents of **contamination** reported in 2007 involved food (19), feed (7) and seed (2). This year saw an increase in the number of feed cases reported, due to the European Union's Rapid Alert System for Food and Feed now making a clear distinction between the two.

The cause of the contamination in food and feed was often neither determined nor investigated, but in most cases the contamination must have been the result of poor quality control measures following either cross-pollination or post-harvest mixing.

There were 11 cases of **illegal release** of GMOs detected in 2007. Four cases involved the illegal sale of GM zebra danio fish. Two cases involve the spillage of seed from trucks, in Japan (oilseed rape) and Brazil (cotton). Two cases involve GM lines that have been part of field trials in past years, now appearing in commercially cultivated fields in Germany (oilseed rape) and Thailand (maize). The final three cases are soybean growing in Romania, which was legal until it joined the EU in 2007, the continued illegal growing of GM maize in Mexico and the discovery of GM maize in Peru where no commercial planting is allowed.

The 2007 incidents of contamination and illegal release involved cotton (1), fish (4), maize (9), oilseed rape (2), papaya (1), rice (20) and soybean (2). A big change in the data for 2007 shows that 25% of incidents over the past ten years have been in rice, despite the fact there is no commercial cultivation of GM rice anywhere in the world. These cases have been caused by three varieties of herbicide tolerant rice developed by Bayer Crop Science – LLRICE62, LLRICE601 and LLRICE604 – and Bt63 rice from China. None of these illegal releases initially came to light in 2007; Bt63 was first discovered in 2005 and Bayer's LLRICE varieties in 2006. Yet they continue to cause major problems for a rice industry which has rejected genetic modification.

As in previous years, there is little evidence that the underlying lessons from previous episodes of contamination have been learnt. The evidence from the contamination incidents in 2007 reinforces the findings of previous reports from the GM Register. The following realities still have to be acknowledged:

- there are significant problems posed by the sale, testing and promotion of GM crops in countries where the existing infrastructure will not allow even basic controls to succeed.
- efforts to isolate GM crops through separation from other crops are unlikely to prevent contamination even if accompanied by serious enforcement regimes and quality control procedures.
- the international nature of the crop commodity market and the companies selling GM crops means that an international response is needed to contain GM contamination.
- as the review of the Bt10 incident illustrated in 2005, and the LLRICE601 incident confirmed in 2006, it is probably impossible to prevent all GM contamination and the potential for serious harm remains.

1.2 Ongoing contamination from experimental GM crops and animals

Testing for contamination assumes prior knowledge of inserted genes or sequences. However, around the world many thousands of field trials of GM crops have taken and are taking place, utilising a large range of genes and regulatory sequences. Many of these are only grown outdoors for one or two years, with information about the genes they contain covered by commercial confidentiality agreements. Companies consistently refuse to divulge adequately detailed information to allow government regulators to screen for contamination by the experimental varieties. Routine testing will therefore often not identify contamination from these experimental crops.

Nevertheless, the Contamination Register now contains 67 records of incidents where the source of contamination was from GM varieties that have never been commercially available, i.e. the varieties were only ever cultivated in experimental trials. In most cases there were regulations in place to require containment measures to prevent uncontrolled release into the environment, measures which theoretically should have prevented any release beyond a laboratory, glass or animal house. What is striking here is that experimental seeds are considered to be very valuable and are undergoing evaluation; it might therefore be expected that they would be strictly controlled.

Genetic engineering companies are currently researching and developing crop plants that produce pharmaceutical or industrial products, crops with altered nutritional properties, and crops that can grow in a wider range of environmental conditions (e.g. salt or drought tolerance). Irrespective of whether these crops ever become a commercial reality, if they were to contaminate the seed and food supply and be distributed around the world, the implications for environmental and food safety could be very serious.

Two cases of GM contamination included in the register involved crops designed to produce pharmaceuticals, raising particular concerns about possible negative impacts on human health. The likelihood of potentially dangerous products entering the food chain is therefore not a remote possibility, but indeed a very real threat that governments and the food industry must face.

Contamination from field trials is an ongoing environmental threat as well. The Scotts Company was forced to enter into a $500,000 settlement with the USDA after the Agency found the company's herbicide-tolerant grass had contaminated the surrounding countryside. This is the first documented case of its kind and the full extent of the contamination remains unknown as do the full environmental impacts, how long it will take to remove all the plants and at what financial cost.

Genetically modified animals should be simpler to control than plants. They are kept in animal houses and rarely allowed into an open environment. Each individual is tagged and monitored. Despite this, the GM Contamination Register has still recorded four separate incidents where genetically modified pigs have been released into the food or feed supply. These incidents suggest that laboratory technicians may be getting blasé about GM animals and do not appreciate the dangers they may pose.

1.3 Responses to GM contamination

A number of methods have been developed over the years in an attempt to prevent contamination. Initially, preventative measures were taken because the GM crops were experimental, but as consumers around the world started to reject GM crops methods have also been developed to try to maintain separation from non-GM crops. These methods include:

- separation distances – ensuring a physical separation between the GM and non-GM crops to reduce pollen flow;
- temporal separation - the GM crop is planted at a different time from neighbouring crops of the same species. The aim is to prevent simultaneous flowing and pollination;
- physical barriers to gene flow (e.g. bagging or removing flowers);
- biological barriers to gene flow (e.g. male sterility); and
- requirements for dedicated equipment and machinery or protocols for the cleaning of equipment between fields.

Despite these measures, the evidence of the GM Contamination Register is that contamination has continued.

In this report, we review global responses to contamination: two international initiatives, the Cartagena Protocol on Biosafety (CPB) and the Codex Alimentarius; one national approach – that of the US Department of Agriculture (USDA); and two technical approaches, plastid transformation and genetic use restriction technologies (GURTs). Each of these initiatives clearly signals recognition of, and is an attempt to address, current problems of GM contamination. However, clear shortcomings to each approach remain.

The international agreement on the transboundary movement of living modified organisms, the Cartagena Biosafety Protocol, does have provisions to determine some contamination (that involving the movement of LMOs between parties) as illegal. However, current reporting mechanisms do not appear to be working and there is a very real concern that developing countries may lack the capacity to undertake necessary testing.

The world's largest grower and exporter of GM crops, the United States, is revising regulations to address conditions leading to both national (e.g. creeping bentgrass) and global (e.g. LLRICE601) contamination incidents. Its approach seems to be twofold. Firstly, the USDA is attempting to reduce contamination from crops deemed to be the most risky, i.e. crops producing pharmaceutical and industrial products. However, the extent to which they will actually restrict the production of these most risky GM crops is unclear. Secondly, they will formalise contamination of the food chain by authorising low level presence (LLP) for GM plants which are deemed to be of low risk.

This approach of 'legalising' low level contamination is reflected in the US-derived proposals to the Codex Alimentarius Commission, to make widely available to other governments the information necessary to authorise such contamination once it has occurred. However, these proposals are voluntary and it remains unclear how they will be used, but clearly any such measures should not be used to undermine national biosafety legislation. Furthermore, Codex only deals with food safety and cannot address issues of environmental impact or broader socio-economic issues.

Two key technical solutions to contamination are the use of plastid transformation and GURTs. Both of these technologies are at very early development stages and even if technical problems were overcome they would only prevent some contamination incidents. Further, the power of GURTs to affect the livelihoods of large numbers of people around the world is likely to remain a considerable block to their development.

GeneWatch UK and Greenpeace again consider that these findings require that governments:

- ***require*** event-specific detection methods for GMOs as a prerequisite for field trials in addition to commercialisation. The detection methods and associated reference materials should be made publicly available to facilitate identification in case of GMO escape;
- ***urgently enforce*** international standards for the identification and documentation of transboundary shipments of GMOs;
- ***ensure*** that the public interest outweighs commercial confidentiality issues;
- ***target*** imports of food, feed and seed from high-risk, GM-growing countries for routine tests for GM contamination and subsequent investigation;
- ***deny*** to companies their right to commercialise GM products if the companies are involved in intentional illegal releases of GMOs or fail to cooperate in their prevention and management;
- ***act firmly*** against violators when an illegal act takes place. Without substantial and predictable sanctions, sloppy practice and complacency are likely to be encouraged;
- ***oblige*** companies to keep records of the global dissemination of their products and GMO events, and make these publicly available, as a matter of product stewardship; and
- ***stop*** all approvals and releases of GMO under present conditions.

that the Parties to the Biosafety Protocol and Convention on Biological Diversity:

- ***introduce*** national and international rules to provide strict liability for environmental, health and/or economic damage that arises from GM contamination and illegal growing. The biotechnology company producing the GMO should be considered liable unless it can demonstrate negligence by another party. Procedures and mechanisms must be established to ensure redress, to ensure environmental damage is prevented and remedied. An international fund must be established to ensure that liability and redress is always available;
- ***establish*** an independent, international commission to investigate GM contamination and implement measures to reverse GM contamination;
- ***establish and maintain*** a global and publicly available register of cases of contamination, illegal releases and negative agricultural side-effects within the framework of the CPB; and
- ***ensure*** that the CPB Clearing House is fully informed about illegal transboundary movements of GMOs as soon as they are detected.

that companies, insurers and investment companies:

- ***review*** the potential liabilities of GMO development and sales and disclose these liabilities fully in their financial reporting.

GM contamination incidents in 2007

2

GM canola pollen can travel for many kilometres
© Greenpeace/Nimtsch

Large scale commercial planting of GM crops began in 1996, but there is no global monitoring scheme of their impacts on food production or the environment. Because of this failure of international agencies, GeneWatch UK and Greenpeace International started the GM Contamination Register in June 2005. The register contains records of:

- **contamination incidents** – when food, feed or a related wild species has been found to contain unintended GM material from a GM crop or other organism. These are included when there is evidence from laboratory testing that GM contamination has occurred;
- **illegal plantings or releases of GMOs** – when an unauthorised planting or other release into the environment or food chain has taken place. These cases are included when there has been official acknowledgement that rules on the release of GMOs have not been followed; and
- **negative agricultural side-effects** – when there has been a report in the scientific literature of agricultural problems arising from the GMO and how it is managed.

Only those incidents that have been publicly documented are recorded. As such, the register entries represent a sample of the actual contamination incidents that have taken place globally. There will be others that are, as yet, undetected or unreported because in most countries there is no systematic monitoring of GM crops post-commercialisation and any contamination that is detected as part of food producers' quality control procedures is not published. It is probable that the large majority of GM contamination incidents fall into the undetected or undisclosed category. In addition, any contamination by non-commercialised GMOs, such as those in experimental trials, would not usually be detectable as no analytical identification methods are available. This is because companies are not required to submit these when applying for GM crop field trials.

Therefore, the register only gives details of the known incidents of GM contamination, illegal plantings and adverse agricultural side-effects that have occurred during the first eleven years of commercial GM crop cultivation. Despite the fact that it cannot be comprehensive, it provides the only public resource available to examine the causes of GM contamination and to inform control measures.

2.1 Changes to the reporting format

In past years there had been some discrepancies in the way incidents of contamination were recorded on the register. Due to the global nature of the agriculture and food industries, a contamination incident in one country may result in that product being found in many countries in the world over a number of years. The most extensive example of this is Bayer's LLRICE601. The source of contamination is likely to have been from US field trials last conducted in 2001. Contaminated rice has now been found in 29 countries and it is not clear that more will not yet be found. Previously this type of contamination event was recorded on the register as one incident in the US, but that did not allow people searching the database to easily identify the contamination that was happening in a particular country.

However, it has never been the aim of the GM Contamination Register to attempt to record a new incident every time testing is carried out and GM contamination found. For instance, during 2006 the Austrian authorities reported 37 separate incidents of LLRICE601 contamination. The amount of testing, and therefore the number of incidents reported is more likely to be reflective of the policy and resources of a particular country than the actual number of incidents that have occurred.

For 2007 therefore, some changes have been made. Each time a specific GM line is found to be present within a country in a particular year it is recorded as a new incident. However, if that same specific GM line is identified in the same country and in the same year, details are simply added to the existing incident.

The aim of this approach is to give some indication of the extent of spread, both geographically and over time, of any given contamination without filling the register with too many repetitive entries.

This report gives information about the additions to the register in 2007 and highlights important cases and trends. Short details of all of the incidents are included in Chapter 6.

2.2 Contamination in 2007

In 2007, 39 incidents were added to the register. In addition, changes to the reporting format and the discovery of new cases led to the addition of 1 case for 2003, 2 cases for 2005 and 32 cases for 2006 bringing the total number of incidents recorded in the database to 216.

Of the 39 incidents reported in 2007, 28 were contamination involving food (20), feed (7), and seed (1).There were also 11 cases of illegal releases involving seed (5) volunteer weeds (1) feral populations (1) and fish, which are recorded as 'other' (four). Table 1 shows the occurrence of the categories of incidents over time.

The change in reporting this year has led to a greater reflection of events that are ongoing. For instance LLRICE601 contamination of US seeds stocks continues to be found around the world and also the ongoing spillage of seed from trucks importing oilseed rape into Japan continues to be reported.

Table 1: Categories of reported incidents 1997–2007

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	**All**
Contamination	1	1	3	19	16	17	9	16	10	45	28	**165**
Illegal releases	1	1	1	1	2		2	3	10	11	11	**42**
Negative agricultural side effects	1	1	2					1	3			**8**
All	**3**	**3**	**6**	**20**	**18**	**17**	**11**	**20**	**23**	**56**	**39**	**216**

Table 2: All incidents according to country 1997–2007
(NB. Percentages are rounded so do not total 100%)

COUNTRY	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	TOTAL
USA	1		2	2	2	3	2	5	2	3	2	24 (11%)
Germany		1		2				1	1	5	5	15 (7%)
UK			1	3	1	3	1	1		2	2	14 (6%)
France				3	3	1				4	1	12 (6%)
Canada	1	1		1	1	3	1	1			1	10 (5%)
Australia				1		2	2		4			9 (4%)
Japan				1				1	2	3	2	9 (4%)
Mexico					1		1		1	3	2	8 (4%)
Brazil		1						2	1	2	1	7 (3%)
New Zealand				1		1	1	1	1	1	1	7 (3%)
Netherlands				1				1		1	3	6 (3%)
Romania									3	2	1	6 (6%)
Austria					1					2	2	5 (2%)
Italy							1			1	3	5 (2%)
China									1	2	1	4 (2%)
India					2				2			4 (2%)
Ireland						1			1	1	1	4 (2%)
Greece				1				1		1	1	4 (2%)
Sweden				1						1	2	4 (2%)
Spain							1		2			3 (1%)
Denmark				1				1		1		3 (1%)
Philippines					1					2		3 (1%)
Thailand			1					1			1	3 (1%)
Cyprus										1	2	3(1%)
Finland										1	2	3 (1%)
Argentina					1			1				2 (1%)
Bolivia					1	1						2 (1%)
Croatia	1							1				2 (1%)
South Korea				1						1		2 (1%)
Switzerland			1			1						2(1%)
Bulgaria										1	1	2 (1%)
Guatemala								1		1		2 (1%)
Nicaragua						1				1		2 (1%)
Peru					1						1	2 (1%)

COUNTRY	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	TOTAL
Poland					1					1		2 (1%)
Slovenia										2		2 (1%)
Europe									1			1 (<1%)
Chile								1				1 (<1%)
Columbia					1							1 (<1%)
Egypt				1								1 (<1%)
Ecuador					1							1 (<1%)
Hungary										1		1 (<1%)
Russia			1									1 (<1%)
Serbia									1			1 (<1%)
South Africa										1		1 (<1%)
Taiwan							1					1 (<1%)
Czech Republic											1	1 (<1%)
Kuwait										1		1 (<1%)
Belgium										1		1 (<1%)
Ghana										1		1 (<1%)
Luxembourg										1		1 (<1%)
Malta										1		1 (<1%)
Norway										1		1 (<1%)
Sierra Leone										1		1 (<1%)
United Arab Emirates										1		1 (<1%)
TOTALS	**3**	**3**	**6**	**20**	**18**	**17**	**11**	**20**	**23**	**56**	**39**	**216**
	1%	**1%**	**3%**	**9%**	**8%**	**8%**	**5%**	**9%**	**11%**	**26%**	**18%**	

GM organisms involved

The 2007 incidents of contamination and illegal release involved cotton (1), fish (4), maize (9), oilseed rape (2), papaya (1), rice (20) and soybean (2). Table 3 shows how different organisms have been involved over time. A big change in the data for 2007 shows that 25% of incidents over the past ten years have been caused by rice, despite the fact there is no commercial cultivation of GM rice anywhere in the world. These cases have all been caused by varieties of herbicide tolerant rice LLRICE62, LLRICE601 and LLRICE604 (all developed by Bayer Crop Science) and Bt63 from China.

Table 3: Contamination register incidents by organism and year
(NB. Percentages are rounded so do not total 100%)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	**TOTAL**
Maize	1	1	2	8	6	6	6	6	8	8	9	**61(28%)**
Rice									1	33	20	**54(25%)**
Soybean		1	3	2	8	4		5	4	9	2	**38(18%)**
Oilseed rape/canola	1	1		4	2	4	2	3	4	1	2	**24(11%)**
Cotton	1		1	2	1	2		1	3	2	1	**14(6%)**
Papaya							1	3		1	1	**6(3%)**
Fish										1	4	**5 (2%)**
Pigs					1	1	1	1				**4(2%)**
Sugar beet				4								**4(2%)**
Grass								1		1		**2(1%)**
Plum									1			**1(<1%)**
Potato									1			**1(<1%)**
Tomato							1					**1(<1%)**
Zucchini									1			**1(<1%)**
TOTAL	**3**	**3**	**6**	**20**	**18**	**17**	**11**	**20**	**23**	**56**	**39**	**216**

Causes of GM contamination

When recording incidents, the register makes a distinction between categories such as 'illegal release' and 'contamination incident'. Sometimes early and later incidents with the same product may have different categories. For example, for LLRICE601 the initial case was an illegal release of an unapproved variety and subsequent incidents (when LLRICE601 was found in products imported from the US) are classified as contamination incidents.

The 28 incidents of contamination reported in 2007 involved food (19); feed (7) and seed (2). This year saw an increase in the number of feed cases reported, due to the European Union's Rapid Alert System for Food and Feed (RASFF) now making a clear distinction between the two.

The cause of the contamination in food and feed was often neither determined nor investigated, but in most cases this must have been the result of poor quality control measures following either cross-pollination or post-harvest mixing.

GM maize contamination in Mexico

As a review of the Bt10 incident illustrated in 2005, and the LLRICE601 incident confirmed in 2006, it is probably impossible to prevent all GM contamination and the potential for serious harm remains.

Maize (*Zea mays*) is one of the world's most important staple crops. It is generally accepted that it originated in Mesoamerica where both wild relatives (teosinte) and a rich diversity of landraces exist today. This places Mexico as both culturally and biologically important in respect of maize conservation. For these reasons the Mexican government has not authorised the commercial cultivation of GM maize in Mexico. However, Mexico does import maize from the US for food use. This imported grain contains the herbicide-tolerant and insect-resistant GM varieties that are currently grown in the US.

The first recorded cases of GM contamination of maize in Mexico were in 2001 in the state of Oaxaca. While the research, published in the journal Nature,[2] was initially questioned, there have since been a number of studies showing that contamination is indeed present and continuing in Mexico. However, there have also been studies that have not detected GM contamination.

A study was carried out between 2003 and 2004 (published in 2005)[3], which took seed samples from 870 plants in 125 fields and 18 localities in the state of Oaxaca. In this study researchers failed to detect transgenic DNA in any of the samples and the researchers concluded that contamination was rare or absent in the sampled area.

In 2003, a study[4] involving academics, indigenous communities and NGOs found GM maize growing in nine Mexican states.

In 2004, a report was published by the North American Commission for Environmental Co-operation.[5] The report acknowledged there was no doubt that transgenes had entered some landraces of Mexico, that genes for traits such as insect resistance were likely to persist in the populations, and that for many Mexicans the presence of transgenes in maize is an unacceptable risk to their traditional farming practices, and to the cultural, symbolic, and spiritual value of maize in Mexico.

A study published in November, 2006 by the National Forest, Agriculture and Livestock Research Institute (INIFAP)[6] recognised positive results for GM transgenes found in the state of Sinaloa, in northwest Mexico.

In June 2007,[7] a study identified GM maize growing in a conservation soil area in the federal district of Mexico City, in Milpa Alta, Xochimilco and Tlahuac delegations.

It is particularly important that robust studies are carried out in Mexico to ascertain the true extent and nature of GM contamination. GM contamination is particularly worrisome in regions where our cultivated plants originated, the "centres of diversity", such as Mexico is for maize. The greatest diversity of varieties, or landraces, and related wild species are found there. Agriculture is dependent on plant diversity and their genetic "reserves" in order that their desired properties can be bred to cultivated plants. Although there may be no immediately apparent adverse effects from the GM contamination, this is contamination of our genetic reserves for maize. Problems may arise in future maize generations, at a later date. Hence, this GM contamination in centres of origin and diversity threaten not only cultural and social values, but global food supply too.

The illegal spread of GM fluorescent fish

In November 2004, the UK's GM Inspectorate was warned that a consignment of GM tropical fish was due to arrive from Malaysia into the UK at one of the country's main airports on a specific date. Very little information was available about the consignment, but it was believed to be fluorescent zebra danio (*Danio rerio*). Despite an investigation, the GM fish could not be found and no further action was taken.

On 3 February 2006, the Japanese Ministry of the Environment and Ministry of Agriculture, Fisheries and Food announced a recall of the unapproved GM medaka or Japanese killifish, *Oryzias latipes*, known as 'Night Pearl' that was developed in Taiwan and imported into Japan. It was reported that 800 fish had been distributed to 12 different pet shops. The fish had contained a jellyfish gene making them fluorescent.

In November 2006, the Competent Authority in the Netherlands issued a report confirming that suspect fish had been genetically modified to contain the red fluorescent protein (RFP) gene and had illegally been placed on the market. Further reports also confirmed GM zebra danio had been marketed illegally in other EU member states including Germany, Austria and the Czech Republic.

In April 2007, it was confirmed that unapproved GM florescent zebra danio fish were being sold in the UK. In May, a notice was issued to all fish importers and retailers warning them of the findings. In June, GM fish were seized from a small number of retailers in the UK.

In July 2007, the New Zealand Ministry of Agriculture and Fisheries, seized and destroyed 300 GM zebra danio fish that are thought to have been imported from Singapore.

Illegal releases

There were 11 cases of illegal release of GMOs detected in 2007. Four cases involved the illegal sale of GM zebra danio (see *'The illegal spread of GM fluorescent fish'*). Two cases involve the spillage of seed from trucks in Japan (oilseed rape) and Brazil (cotton). Two cases involve GM lines that have been part of field trials in past years now appearing in commercially cultivated fields in Germany (oilseed rape) and Thailand (maize). The final three cases are soybean growing in Romania, which was legal until it joined the EU in 2007, the continued illegal growing of GM maize in Mexico, and the discovery of GM maize in Peru where no commercial planting is allowed.

Canola Segregation Impossible

Canola is one of the worst candidate crop species for segregation of GM and non-GM because it is so promiscuous. The only major producer of GM canola is Canada, where the extent of contamination is so widespread that more than 90% of certified non-GM Canadian canola seed samples contain unintended transgenes.[11]

Unfortunately, Canada's GM canola contamination has spread beyond Canada. Japan now has GM canola weeds, resulting from Canadian imports of canola seed for crushing. These are now widespread around ports and along transport routes.[12] The weeds are a result of spillage from transport, which is inevitable, given the small size of canola seed. In fact, it is a common saying among farmers that if a truck cannot hold water, it cannot hold canola seed, as the seed is so small and leaks out of the smallest hole or gap in the back of trucks.[13]

In 2007, German authorities also found GM canola contamination in conventional crops. About 1500 hectares were planted with seed contaminated with GM canola tolerant to the herbicide glufosinate (sold by Bayer under the trade name Liberty). Since the cultivation of GM canola is forbidden in Europe, German authorities ruled that all of the plants had to be destroyed immediately. The origin of the contamination is unclear.[14]

Illegal rice Bt63 from China continues to contaminate food products

In April 2005, GM rice seeds were found by Greenpeace China to have been sold and grown commercially for a number of years in central China's Hubei province. GM rice is illegal in China; it has not been approved as safe for either human consumption or the environment.

Seed companies in China that were found to have sold GM rice hybrid seed to farmers operate directly under the university developing GM rice, and it has been reported that the key scientist even sat on the board of one of the seed companies.[8]

Following the first exposure of the illegal GM rice, more cases of contamination have been revealed involving almost all parts of the food chain. It was found in wholesale market and unpackaged rice in supermarkets. In 2006 it was also found in baby food sold in Beijing, Guangzhou and Hong Kong. In late 2006, the GM rice Bt63 was found for the first time outside the People's Republic of China in Europe: ten cases of GM rice contaminated products were reported by European governments (Austria, France, UK and Germany),[9] and other cases were found by Greenpeace and Friends of the Earth.

The Chinese government took several measures to try to stop the contamination, which included punishing seed companies, confiscating GE seed, destroying GM rice grown in the field and tightening control over the food chain. Despite these efforts and as with the StarLink corn incident in the past the GM rice has still not been removed from the food chain. In 2007, it was found again in ten imports to Europe (Cyprus, Germany, Greece, Italy, Sweden)[9]. It was also found in a number of products imported to Japan,[10] which had been testing for Bt63 since September 2006 but did not find contaminated products until January 2007.

Discussion

The register for 2007 is dominated by the ongoing contamination of the world rice supplies by mainly LLRICE601 but also Bt63 from China. Neither of these illegal releases initially came to light in 2007. Bt63 was first discovered in 2005 and LLRICE601 in 2006. Yet they continue to cause major problems for a rice industry which has rejected genetic modification.[1]

As in previous years, there is little evidence that the underlying lessons from previous episodes of contamination have been learned. The most common response from officials and the industry remains that the incidents have not been dangerous, despite the lack of data upon which to base such a conclusion. The evidence from the contamination incidents in 2007 reinforces the findings of our first report from the GM Register.

The following realities still have to be acknowledged:

- there are significant problems posed by the sale, testing and promotion of GM crops in countries where the existing infrastructure will not allow even basic controls to succeed.
- efforts to isolate GM crops through separation from other crops are unlikely to prevent contamination even if accompanied by serious enforcement regimes and quality control procedures.
- the international nature of the crop commodity market and the companies selling GM crops means that an international response is needed to contain GM contamination.
- as the review of the Bt10 incident illustrated in 2005, and the LLRICE601 incidents confirmed in 2006 and 2007, it is probably impossible to prevent all GM contamination and the potential for serious harm remains.

Contamination incidents from experimental GM trials

3

GM canola trial – Australia
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The Contamination Register now contains 67 records of incidents where the source of contamination was from GM varieties that have never been commercially available, i.e. the varieties were only ever cultivated in experimental trials. In most cases there were regulations in place to require containment measures to prevent uncontrolled release into the environment, measures that theoretically should have prevented any release beyond a laboratory, glass or animal house. What is most striking about these particular contamination events is the fact that these seeds and animals are considered to be very valuable and are undergoing safety evaluation: it might therefore be expected that they would be strictly controlled.

Table 4: Summary of contamination from experimental GM trials.

Country	Year	Species	Title
Australia	2002	Cotton	Approved GM Roundup ready cotton contaminated with unapproved GM variety.
Australia	2000	Cotton	Unapproved GM cotton (grown in a field trial) was mixed with non-GM and approved varieties of GM cotton after harvest.
Thailand	1999	Cotton	It was found that Thai farmers were commercially growing illegal GM cotton. Only field trials had been authorised.
USA	2004 + 2006	Grass	USA - Roundup Ready GM bentgrass escaped from field tests and was then found growing in the wild.
Germany	1998	Maize	Maize field trial contaminates neighbouring commercial crop.
Thailand	2007	Maize	GM maize contamination despite no commercial growing or field trials in the country.
USA, and global	2005	Maize	Syngenta reveals several hundred tonnes unauthorised GM Bt10 maize were produced and distributed between 2001 and 2004.
USA	2002	Maize	USA – experimental GM maize to produce a vaccine allowed to flower, risking contamination of neighbouring fields which had to be destroyed. The following year, maize volunteers were found amongst soybeans destined for human consumption.
Canada	1997	Oilseed rape/ canola	Limagrain and Monsanto withdrew GM oilseed rape because it contained an unauthorised gene.
UK	2002	Oilseed rape/ canola	Unauthorised GM oilseed rape used in UK Government's Farm-Scale Evaluations.
Taiwan	2003	Papaya	Unauthorised GM papaya found in markets. Contamination most likely from field trials.
Thailand	2004	Papaya	Thailand – papaya contaminated.
Canada	2002 + 2004	Pig	Two cases of experimental GM pigs made into animal feed.
USA	2001 + 2003	Pig	Two cases of experimental pigs entering the food chain. One as a result of theft, the other was ongoing negligence leading to 386 pigs being sent to slaughter.
USA and global	2006-2007	Rice	USA LLRICE601, LLRICE604 and LLRICE62 are all found to have contaminated food and seed stock. The contamination is exported around the world.
France, Germany, Netherlands, UK	2000	Sugar beet	Aventis field trials of glufosinate-ammonium tolerant GM sugar beet were found to be contaminated with an unauthorised variety also tolerant to glyphosate.
USA	2003	Tomato	Scientists mistakenly distributed GM tomato seeds to colleagues in the US and overseas.

While not all the events recorded by the GM contamination register and listed in Table 4 resulted in food contamination, many did. The likelihood of untested and potentially dangerous products entering the food chain is not a remote possibility but a very real threat that governments and the food industry must face.

Global GM contamination events such as Starlink, Bt10, and LLRICE601, plus consumer preferences and the requirement for GM labelling in the EU, have led certain sectors of the food industry and a number of governments to regularly test commodity crops such as soya, maize, and oilseed rape for GM contamination.

One issue already faced when testing bulk commodity crops is uncertainly about which GM lines may or may not be present, therefore to identify if any GM crops are present it is common to test for commonly used gene sequences such as the 35s or nos regulatory sequences. Alternatively, companies or governments may test for the presence of the transgene product such as the pat protein, which confers tolerance to the herbicide glufosinate ammonium.

However, around the world many thousands of field trials have taken place, utilising a large range of genes and regulatory sequences. The GM plants used in these trials would not always be detected by the current GM testing methods described above. Many of these crops may only be grown outdoors for one or two years, most are covered by commercial confidentiality agreements and companies are often reluctant or outright refuse to divulge detailed information, even to government authorities.[15] Routine testing will therefore often not identify contamination from these experimental crops.

As the development of genetic modification continues, research is being conducted into crops producing pharmaceutical or industrial products, crops with altered nutritional properties, and crops that can grow in a wider range of environmental conditions (e.g. salt or drought tolerance). Irrespective of whether these crops ever become a commercial reality, if they were to contaminate the seed and food supply and be distributed around the world, the implications for environmental and food safety could be very serious.

The UK campaign group GM Freeze published a report in May 2007[16] which identified numerous countries from which the UK imports food products and which are conducting GM trials for those crops. The report highlighted to UK food retailers the risk of contaminated imports and the difficulties they would have in testing without knowledge of the GM crops being grown experimentally around the world.

Two cases of GM contamination included in the register involved crops designed to produce pharmaceuticals, raising particular concerns about possible negative impacts on human health. The likelihood of potentially dangerous products entering the food chain is therefore not a remote possibility, but indeed a very real threat that governments and the food industry must face. The US group the Union of Concerned Scientists is calling for the USDA to prohibit the outdoor cultivation of genetically engineered food crops for the purpose of producing pharmaceutical and industrial chemicals.[17]

Contamination from field trials is not only a threat to food safety. The Scotts Company was forced to enter a $500,000 settlement with the USDA after the Agency found the company's herbicide-tolerant grass had contaminated the surrounding countryside. This is the first documented case of its kind and the full extent of the contamination remains unknown as do the full environmental impacts,[18] how long it will take to remove all the plants and at what financial cost.

Genetically modified animals should be simpler to control than plants. They are kept in animal houses and rarely allowed into an open environment. Each individual is tagged and monitored. Despite this, the GM Contamination Register has still recorded four separate incidents where genetically modified pigs have been released into the food or feed supply. These incidents suggest that laboratory technicians may be getting blasé about GM animals and do not appreciate the dangers they may pose.

In the rest of this section, we provide brief details of incidents where unauthorised GM plants and animals have been mixed with authorised ones for either field or experimental use. Additional documentation and references for all these cases can be found on the GM Contamination Register website at www.gmcontaminationregister.org.

3.1 Syngenta's Bt10 maize - 4 cases

2005 saw the unfolding of the first international case of an experimental GM crop contaminating food supplies on a global scale. Syngenta had produced two types of insect-tolerant and herbicide-resistant maize, Bt10 and Bt11. Only one – Bt11 maize – was eventually evaluated for food safety and made commercially available. However, Syngenta's quality control systems failed to detect that, for at least 4 years, Bt10 seeds had been contaminating commercial stocks of Bt11. A full account of the events and implications is given in the GM Contamination Register 2005 annual report.[19]

Some of the key issues to emerge from this incident were:

- the control systems used by biotechnology companies to keep GM lines separate were not adequate;
- the authorities were not aware of the existence of Bt10 and therefore could not have tested for it;
- it was an independent seed company attempting to breed from what they believed to be Bt11 that identified the contamination;
- no specific Bt10 test was available until at least 4 months after the company first informed the US authorities about the contamination. In fact no test was made available until after Europe and Japan were informed and wanted to test for imports; and
- obligations for information exchange under the Biosafety Protocol were ignored by all those affected by the Bt10 contamination incident.

3.2 Liberty Link rice from Bayer Crop Science - 41 cases

On 18 August 2006, the US Secretary of Agriculture announced that Bayer Crop Science had reported that rice from the 2005 crop being sold commercially in the US had been found to be contaminated with a GM variety, LLRICE601, which was not approved for growing and consumption anywhere in the world.

The rice is genetically modified to be tolerant to the herbicide glufosinate ammonium (trade name: Liberty), but development of the LLRICE601 variety was ended in 2001. Two other varieties of glufosinate tolerant rice, LLRICE62 and LLRICE06, are approved in the US but are not currently being grown commercially.

In March 2007, the USDA confirmed that a commercial rice variety, Clearfield, had become contaminated with another unapproved experimental rice variety from Bayer Crop Science, LLRICE604.

Although LLRICE62 is approved in the US for cultivation, it is not sold commercially yet was discovered in rice imports in France (2006) and Austria (2007). LLRICE62 does not have authorisation in the European Union.

Since that first announcement by the US, the GM Contamination Register has recorded illegal rice from the US in 29 Countries around the world:

Austria	Ghana	Nicaragua
Belgium	Greece	Norway
Canada	Guatemala	Philippines
China	Ireland	Poland
Cyprus	Italy	Sierra Leone
Czech Republic	Kuwait	Slovenia
Denmark	Luxembourg	Sweden
Finland	Malta	United Kingdom
France	Mexico	United Arab Emirates
Germany	The Netherlands	

Many reports and articles have been written on the subject[20] to assess cause, responsibilities, the way the situation was subsequently handled and the cost to the rice industry. For the purposes of this report, the most important information is how the contamination occurred in the first place. In the USDA's official report of the incident,[21] they state that, while LLRICE601 was grown at the same location (the Rice Research Centre North Farm in Crowley, Louisiana) as the commercial variety Cheniere during 1999, 2000 and 2001, it was never planted less than 165 feet away. Furthermore, Cheniere was never planted on a location that had previously been occupied by LLRICE601. While the report states that some records were missing or never kept, many were and all the proper isolation procedures appeared to have been followed. The report could not conclude if Cheniere had been contaminated via gene flow (by pollen from LLRICE601 being carried by the wind to fields of Cheniere) or by mechanical mixing.

3.3 Roundup Ready creeping bentgrass - 2 cases

Between 1999 and 2005, the Monsanto-owned Scotts Company LLC conducted a field trial of genetically modified creeping bentgrass (*Agrostis stolonifera*).The grass had been modified to be tolerant to Monsanto's herbicide Roundup.

During the course of those trials, Scotts was found by the USDA to have been at fault, on a number of occasions, primarily for failing to carry out procedures meant to contain the grass plants within the trial site. More specifically, in 2003, at one of the trial sites in Jefferson County, it was found that Scotts had allowed the grass to produce seed and for the seeds to be dispersed into the neighbouring environment.[22]

In 2006, scientists from the US Environmental Protection Agency identified the GM bentgrass from the test site in the surrounding landscape, up to 3.8km away.

GM grasses raise serious environmental concerns because they are freely wind pollinating, often spread via underground shoots (tillering), and a number of species (including creeping bentgrass) are perennial. These factors all add together to increase the persistence of the GM plants themselves and the transgenes in the environment.

3.4 Papaya – 2 cases

In both Taiwan and Thailand, genetically modified papaya thought to have originated from field trials has been found to be growing in farms and being sold in market places.

In Taiwan in 2003, papaya modified to be resistant to papaya ringspot virus was discovered growing in farms and for sale in local market places. By 2006, the Taiwanese government was still issuing warnings that anyone found growing or selling such fruits could face a fine of between NT$1 million and NT$5 million[23].

In Thailand, according to a Department of Agriculture memorandum of November 2004, 85 north-eastern farmers were found to have grown GM papaya. The memorandum states that 329 papaya samples from 85 farms were found to be genetically modified.

The Thai Government said it was taking action to destroy the contaminated trees, which can only have arisen from GM papaya trees being grown experimentally at the government station breeding the trees, because GM papaya is not grown commercially in Thailand.

However, sampling and testing by an independent laboratory for Greenpeace Southeast Asia in June 2005 showed that the government had failed to stop the contamination. Papaya samples from farms in the provinces of Rayong and Kampaengpetch (Central and Eastern regions) have tested positive as the GM variety, confirming that the GM papaya contamination has spread to central and eastern regions.

Following on from these investigations, Thailand's Human Rights Commission conducted tests which have shown that, in July 2005, one-third of papaya orchards tested in the eastern province of Rayong and the north-eastern provinces of Mahasarakham, Chaiyaphum and Kalasin had GM contaminated papaya seeds. The owners are reported to have said that they were given the seeds by a research station. The Commission has called for all the contaminated papaya to be destroyed and farmers compensated.

3.5 Pharmaceutical-producing crops - 2 cases

In 2001, the US company ProdiGene ran field trials of a GM maize which contained genes to produce an experimental vaccine against a pig disease, transmissible gastroenteritis virus (TGEV). In Iowa in September 2002, US Government inspectors discovered volunteer maize plants growing in a soybean field that was used as a ProdiGene test site for the experimental GM maize in 2001. On 12 November, the USDA announced that it had quarantined over $2.7 million worth of soybeans (500,000 bushels) destined for human consumption at a Nebraska grain elevator after finding stalks of ProdiGene's GM maize mixed with the soybeans.

Additionally, because the GM maize volunteers may have pollinated neighbouring commercial maize fields, all maize seed and plant material within 1,320 feet (400 m) of the previous year's test plot was destroyed.

3.6 Experimental tomatoes - 1 case

In 2003, University of California scientists sent small quantities of seed of the processing-tomato variety known as UC-82B to researchers at 12 institutions in the United States and to researchers in 14 other countries. Each sample included about twenty-five seeds to be used in research projects at those institutions.

Two samples were also sent abroad for demonstration gardens in the UK and Ethiopia. UC Davis and the recipients were unaware that these particular UC-82B seeds carried two additional genes, a PG gene and another giving resistance to the antibiotic, neomycin.

The seed had originally been obtained from the company Petoseed (now owned by Seminis Seeds, itself taken over by Monsanto) and a similar variety had been used by Zeneca to produce tomatoes that ripened more slowly for use in the production of tomato paste. Seminis Seeds has had to pay a fine for sending the seeds without proper documentation.

3.7 Pigs - 4 cases

Genetically modified animals should be simpler to control than plants. They are kept in animal houses and rarely allowed into an open environment. Each individual is tagged and monitored. Despite this, the GM Contamination Register has still recorded four separate incidents where genetically modified pigs have been released into the food or feed supply.

In 2001, a laboratory technician at the University of Florida stole three dead experimental GM pigs and had them turned into sausages that were then eaten by at least nine people. The pigs had been genetically modified to contain a copy of the rhodopsin gene which is involved in vision.

In 2002, at the University of Guelph, Canada, 11 GM piglets that had died at birth or shortly after were accidentally sent to a rendering plant and turned into poultry feed. A gene from the bacteria E-coli (coding for the phytase enzyme) had been introduced into the pigs so they were more efficient at digesting plant material and would produce less phosphate and thus have a lower environmental impact.

The animals were not approved for use in rendering for animal feed, but accidentally contaminated 675 tonnes of poultry feed that was sold to egg farmers, turkey farmers and broiler-chicken producers. The Canadian Food Inspection Agency ordered a recall of the feed.

In February 2003, the US Food and Drug Administration reported that its inspectors had found that, between April 2001 and January 2003, researchers at the University of Illinois at Urbana/Champaign released 386 pigs to a livestock dealer. The researchers claimed that the pigs, which were offspring of GM animals, had not inherited the introduced gene, but this could not be verified. The animals should have been incinerated at the end of the study to ensure they did not enter the food chain. The parent animals had been genetically modified to increase their milk supply and to produce a protein known as insulin-like growth factor 1, intended to improve milk digestion by piglets.

In February 2004, it was discovered that three female GM pigs produced by the company TGN Biotech were sent for rendering and made into animal feed for pigs and chickens. Officials seized 800 tonnes of feed. The pigs had been modified to produce protein drugs in their semen, for use in human and veterinary medicine. The company argued that the female pigs would not have been producing the drugs and so posed no danger. However, the pigs did carry the gene coding for the protein. A forklift driver is reported to have missed their ID tattoos, ear tags and microchips.

3.8 Thailand – Cotton and maize - 2 cases

In September 1999, the Thai NGO BioThai revealed that farmers had been growing GM insect resistant cotton which did not have approval for commercial use. Samples were sent to the DNA Technology Laboratory in the Kasetsart University in Nakhon Pathom, and these tested positive for the presence of Bt genes.

In April 2001, the Thai government banned all GM crop field trials, but in December 2007, BioThai reported that it had found GM maize growing at a deserted farm in Phitsanulok's Wang Thong district. According to the Agriculture Department's records, Monsanto obtained permission to import five kilogrammes of the maize from the United States in 1999 to plant on an isolated farm for experimental purposes.

3.9 Australian cotton contamination - 2 cases

In Australia there have been 2 cases of experimental GM cotton contamination, both of which involved Monsanto's herbicide resistant Roundup Ready cotton.

In June 2000, Monsanto reported to the Australian authorities that in May, approximately 57.6 tonnes of Roundup Ready GM cotton seed from field trials were ginned at three gins in Queensland without segregation and identity preservation. This constituted between 4.5 and 9.1% of all cotton seed ginned on that day at the designated gins.

As a result of the lack of segregation and identity preservation, the Roundup Ready cotton seed was mixed with non-Roundup Ready cotton seed. The mixing meant there was no possible means to track the exact fate (export, animal feed or crushing) of the Roundup Ready cotton seed. Sale of whole seed to the domestic market as animal feed is in contravention of the advice of Australia's Genetic Manipulation Advisory Committee (GMAC). The seed was not packaged and secured, therefore seed escape was possible.

In 2002, Monsanto's Roundup Ready GM cotton seed was found to be contaminated at <0.1% level by a different, unapproved variety of GM cotton, also tolerant to the herbicide Roundup. The contamination was considered to have arisen during breeding.

3.10 Unauthorised GM sugar beet contaminates experimental releases in Europe - 4 cases

In 2000, field trial sites of GM sugar beet in the France, Germany, the Netherlands and the UK were found to contain approximately 0.5% of a second, and unauthorised, line of GM sugar beet. The unauthorised GM sugar beet was tolerant to two herbicides, glufosinate and glyphosate. The contamination was noticed when some of the GM sugar beet in the trial plots survived treatment with glyphosate at the end of the trial, thereby showing them to be tolerant to this particular herbicide.

Aventis indicated that the unauthorised GM event was likely to be present due to cross-pollination during the production of the beet seed in Germany.

3.11 Unauthorised GM oilseed rape had contaminated UK experimental trials for at least 3 years - 1 case

In 2002, Aventis (now Bayer), revealed that oilseed rape seed used at 12 sites in the UK's farm scale trials with GM crops was contaminated with an unapproved GM variety. The seed had been used at a total of 25 British trials dating back to 1999.

3.12 GM oilseed rape is removed from sale in Canada – 1 case

In 1997, Limagrain and Monsanto had to withdraw 60,000 bags of their Roundup Ready oilseed rape because they were found to contain a Roundup Ready gene that did not have approval in Canada.

3.13 Germany – cross-pollination by GM maize of neighbouring crop – 1 case

In October 1998, Greenpeace Germany published evidence showing that a Novartis (now Syngenta) GM maize variety had cross-pollinated an adjacent field of conventional maize in Germany. The samples analysed were taken next to a field of GM maize in the region of Baden-Württemberg, in southern Germany, in 1998. The neighbouring farmer did not know that GM maize was growing less than one metre from his field.

Maize cobs up to 10 metres away from the GM-field were taken by the Freiburger Institut für Umweltchemie e.V. and analysed for the GM Novartis maize. The results and subsequent analysis indicated that the rate of cross-pollination was around 5% at the field border, 0.2% at 5 metres and 0.1% at 10 metres distance.

Responses to GM contamination

Greenpeace volunteers cordon off a plantation of BT corn in the Philippines © Greenpeace/Jose Enrique Soriano/Silverlens

The first commercial growing of GM crops was in 1996 in the United States. The GM Contamination Register records its first incident in 1997. The first globally significant incident of contamination involved Starlink maize, a GM variety that was only authorised for use as animal feed but which, in 2000, was found initially in taco shells and subsequently in products around the world.

Although it is often not possible to determine how contamination has occurred, it is possible to identify a number of routes by which contamination may happen. These are:

Cross-pollination of neighbouring crops or related wild species. The extent of cross-pollination will depend on an array of factors including distance between plants, whether they are flowering at the same time, how sexually compatible they are, landscape, and the relative contribution of wind or insects to pollen movement.

Seed spilt at harvest that germinates and contaminates later crops grown in the field. Contamination will depend upon the extent of seed spillage and seed pod shattering, and whether the seed can survive in the soil to germinate in the future.

Seed spilt around fields and on roadsides during transport after harvest. Again, contamination will be influenced by the characteristics of the crop, how the seed is handled and where it is transported.

Mixing of GM and non-GM crops in storage or during distribution. Grain stores or equipment may not be cleaned out properly, or mistakes may be made by operators leading to mixing or errors in labelling.

A number of methods have been developed over the years in an attempt to prevent contamination. Initially preventative measures were taken because the GM crops were experimental, but as consumers around the world started to reject GM crops, methods have also been developed to try to maintain separation from non-GM crops.

These methods include:

- separation distances – ensuring a physical separation between the GM and non-GM crops to reduce pollen flow;
- temporal separation - the GM crop is planted at a different time from neighbouring crops of the same species. The aim is to prevent simultaneous flowing and pollination;
- physical barriers to gene flow (e.g. bagging or removing flowers);
- biological barriers to gene flow (e.g. male sterility); and
- requirements for dedicated equipment and machinery or protocols for the cleaning of equipment between fields.

Despite these measures, the evidence of the GM Contamination Register is that contamination has continued.

Past reviews of the register have called on governments to address this problem because of the risks to human health, the environment and the cost to industry – for example, to farmers growing conventional or GM crops; food processors and manufacturers who want to keep their products GM-free; and retailers who may be forced to withdraw wrongly-labelled products or products containing illegal GM ingredients from supermarket shelves.

The following discussion outlines some of the responses by governments and industry to the issue of contamination. It is not meant to be a comprehensive assessment but will explore some of the approaches and their effectiveness at tackling the global issue of GM contamination.

4.1 The Cartagena Protocol on Biosafety

Also known as the Biosafety Protocol, this multilateral environmental agreement governs the movement of living modified organisms (LMOs – the legal term used for GMOs) across national boundaries. The Protocol excludes processed foods, which are included in the GM Contamination Register. It places a number of requirements on the countries which have signed and ratified it to ensure the safe transfer, handling and use of LMOs internationally.

The protocol regulates the transboundary movement of living modified organisms primarily through a process of Advanced Informed Agreement (AIA), where there must be explicit permission from an importing country before a LMO may be exported. The Protocol has explicit language governing those incidents where this procedure is not followed, as described in Article 25:

Illegal Transboundary Movements

1. Each Party shall adopt appropriate domestic measures aimed at preventing and, if appropriate, penalising transboundary movements of living modified organisms carried out in contravention of its domestic measures to implement this Protocol. Such movements shall be deemed illegal transboundary movements.

2. In the case of an illegal transboundary movement, the affected Party may request the Party of origin to dispose, at its own expense, of the living modified organism in question by repatriation or destruction, as appropriate.

3. Each Party shall make available to the Biosafety Clearing-House information concerning cases of illegal transboundary movements pertaining to it.

The fourth meeting of the Parties to the Protocol will be held in Bonn from 12 to 16 May 2008. Item 4 of the provisional agenda[1] includes the Report of the Compliance Committee, which has flagged illegal transboundary movements of LMOs as problematic, particularly for developing countries:

> *"Finally, the Committee identified the gaps that exist with respect to implementing the requirement to adopt national measures addressing illegal transboundary movements of living modified organisms and reporting the occurrence of such movements to the Biosafety Clearing-House. The Committee noted that most of the incidents of illegal transboundary movements were reported by developed countries suggesting that lack of reporting by developing countries of such movements could be linked to the capacity to detect and identify the presence of living modified organisms. The Committee felt that it was appropriate to make a recommendation to the fourth meeting of the Parties to the Protocol with respect to the need for capacity building for developing country Parties, in particular the least developed and small island developing States among them, as well as Parties with economies in transition, in the area of sampling and detection of living modified organisms in relation to illegal transboundary movements."*

Further, investigation of the website of the Biosafety Clearing House revealed that to date only one report of an illegal transboundary movement had been logged there.[24] Both the report of the Compliance Committee and the evidence from the GM Contamination Register suggest that more cases of illegal transboundary movements are known by Parties to the Protocol but they are not actually complying with Article 25(3).

4.2 Proposed changes to the regulatory measures in the United States

On 17 July 2007, the USDA published a draft Environmental Impact Statement[25] as part of an evaluation of its regulatory regime on biotechnology, and specifically the importation, interstate movement, and environmental release of GMOs.

The current system for regulating GMOs divides responsibility amongst the USDA, the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA). The proposed changes only affect the USDA and the work carried out by its Animal Plant Health Inspection Service (APHIS).

The proposed changes are in response to a report published in December 2005[26] by the USDA Inspector General. The report stated that:

> *"….. at various stages of the field test process – from approval of applications to inspection of fields – weaknesses in APHIS regulations and internal management controls increase the risk that regulated genetically engineered organisms (GEO) will inadvertently persist in the environment before they are deemed safe to grow without regulation".*

Some of the USDA proposals may lead to stricter controls specifically designed to limit contamination. For example, one suggestion is that crops genetically modified to produce industrial or pharmaceutical proteins only be tested in laboratory or glasshouse conditions. Alternatively, only those using non-food crops could be grown in the open air. The options proposed do also include 'business as usual' and as yet it is unknown which will be finally chosen.

1 UNEP/CBD/BS/COP-MOP/4/1.

Another proposal is to maintain some regulatory control over commercialised crops. Currently once a crop is commercialised in the US, it is 'deregulated', that is, all restrictions on its use are removed. The proposed changes would mean conditions could be placed on their use. This proposal is particularly aimed at allowing control over GM crops designed to produce pharmaceuticals or industrial products.

Some proposals are very clearly directed at adapting regulations to accommodate contamination rather than avoid it, for example proposals that establish threshold levels for Low Level Presence, or LLP. When a GMO that is not cleared for food or feed use is found within the food and animal feed supply chain at a 'low' percentage the US Government refers to this as low level presence. The term 'low' has not been specifically defined. The current regulations do not explicitly allow for LLP, however in March 2007 the USDA's Biotechnology Regulatory Service (BRS) published a clarification of their existing approach.[27] They stated that if the GM plant causing the contamination was from an experimental release where only a notification was required, or the GM plant was similar to a product already on the market, no remedial action would be taken. The new proposals suggest that the USDA now wants to want to formalise this approach.[28]

Another area where the reluctance to limit the biotechnology industry is clear is that of financial responsibility. One of the recommendations made by USDA Inspector General that has not been taken up in the proposals was that the USDA should seek legislative authority to require permit applicants to provide proof of financial responsibility.

4.3 Codex Alimentarius – proposals for international standards on 'low level contamination'

The Codex Alimentarius Commission was established in 1963 by the Food and Agriculture Organisation (FAO) and the World Health Organisation (WHO). Its role is to compile a collection of internationally recognised standards, codes of practice and guidelines relating to food, food production and food safety. The Codex Alimentarius is also recognised by the World Trade Organisation (WTO) as a reference point for the resolution of disputes concerning food safety and standards.

In 2005, the US delegation to the Codex Ad-Hoc Intergovernmental Task Force on Foods Derived from Biotechnology proposed guidelines to address the low level presence of GM foods that had been authorised for food safety in the exporting country, but not in the importing country.

The main aim of the proposal was to allow the importing country to carry out a quick and reduced risk assessment based on data provided by the exporting country, which had previously authorised the GMO to at least the standards laid down in the Codex plant guidelines.[29] An Annex to the Codex plant guidelines has now been written which states the information that must be made publicly available. This will be held on a database by the FAO, but initially set up from information on the industry-based AgBios website[30] and the OECD Biotrack product database.[31] As part of this process the EU has consistently pushed for validated detection methods to be made available.

The information required for the food safety assessment is similar to that laid down in the Codex plant guidelines. However, for low level unauthorised contamination only information on potential toxins and allergens is required, not information on "anti-nutrients" or general alterations in nutritional properties of the food. There are also differences in the treatment different types of food.

Commodity crops such as soya or maize, which are assumed to be mixed with non-GMOs or authorised GMOs and therefore present in the diet of an individual in very low concentrations, will be assessed differently to whole foods such as fruit or vegetables where the whole GMO would be consumed and therefore have a greater effect on an individual.

At its September 2007 meeting, the Ad hoc task force agreed on a draft annex for submission to the 31st Session of the Codex Alimentarius Commission to be held in Geneva from 30 June – 5 July 2008. If accepted by the Commission, the annex will be officially added to the guidelines.

However, a number of issues remain. These proposals only deal with GM plants which have been authorised in a Codex member country which is exporting them. There is no register of countries whose authorisation processes comply with the Codex plant guidelines. Not all countries follow the Codex guidelines and there will be no guarantee on the quality or authenticity of the data.

The first global contamination incident involved Starlink[32] corn which was only authorised for animal feed and specifically not for human food because of concerns over its potential allergenic effects in humans. The other most costly and extensive contamination incidents, Bt10 maize and LLRICE601 have both been from experimental crops. Neither had received a food safety assessment. Hence, major contamination incidents have all been from crops that were not authorised for commercial use anywhere.

The Codex annex only deals with food safety issues, not with environmental harm. However, often GM plants are exported as whole foods or grains that do have the potential to grow in that environment. Examples are oilseed rape spilt from trucks in Japan[33] and maize entering Mexico (see *'GM maize contamination in Mexico',* page 15).

Most importantly, the Codex guidelines are voluntary and it is not yet known how this annex will be used in practice. One concern is that richer, more powerful countries may use the annex to prevent poorer countries from blocking imports that contain low levels of unauthorised GM material and subsequently undermine their own safety legislation.

4.4 Biological containment systems

One response to the problems of GM contamination has been to develop further plant genetic modifications that might reduce or eliminate gene flow by altering the plant's reproductive processes.

Two of the key approaches are plastid or chloroplast transformation and genetic use restriction technologies (GURTs), which include the notorious 'Terminator technology'. This latter approach results in the crop producing sterile seed, thus preventing seed saving by farmers. Both approaches are outlined briefly below and their possible effect on contamination cases is considered.

Plastid transformation.

All the commercially available GM plants developed so far have involved introducing novel or transgenic DNA into the nuclear genome. The nucleus of a cell contains the majority of the DNA in a plant. However, DNA does exist in other parts of the cell known as plastids. During pollen formation in many (but not all) plants, plastids are excluded or degraded so pollen does not contain plastid DNA which is inherited maternally through the ovum.

Therefore, if plastid DNA is genetically modified in plants where its inheritance is maternal, the introduced genes (known as transgenes) will not be found in the pollen of the plant and they will not be found in crosses with other crops or wild relatives where the GM crop is the 'father'.

Genetic Use Restriction Technologies (GURTs)

There are two types of GURTs:

- v -GURTs: where the use of the GM crop variety is controlled through seed sterility
- t -GURTs: where the use of a GM trait (such as disease resistance) is controlled.

GURTs were designed because conventional ways of preventing copying, such as patent protection, are difficult to enforce for plants which are self-reproducing. GURTs use a chemically sensitive genetic switch system which is turned on or off by the external application of a chemical. This switch is linked to either a sterility trait in v-GURTs or the GM trait in t-GURTs. The company controls the seed or trait via access to the chemical to be applied. Both types of GURT are still in the development and testing stage. GURTs as a whole are also known as 'Traitor technologies' because they undermine traditional methods of seed saving used by farmers, and v-GURTs as 'Terminator technologies', because they seek to end a plant's ability to reproduce.

Both plastid transformation and GURTs have a number of issues that may limit their ability to prevent contamination.

Both technologies are currently unproven:

- plastid transformation and GURTs remain at the laboratory stage and there are no outdoor trials utilising these technologies at the moment;
- plastid transformation is not 100% effective as there can be "leakage" from the chloroplast to the nuclear genome leading to transgenes in pollen[34]; and
- GURTs require complex engineering of the metabolism of plants and remain at an experimental stage. A number of technical barriers need to be overcome before this technology could be commercially used.[35, 36]

None of these technologies will prevent all cases of contamination:

- for both techniques seed mixing at harvest could still lead to potentially dangerous GMOs entering the food supply;
- plastid transformation is limited to reducing gene flow via pollen. Seeds left in the ground after harvest, spilling by roadsides or being saved or resold by farmers for replanting remain possible;
- contamination incidents such as the Bt10 and LLRICE601 incidents remain likely. In the future, if a company was utilising a GURTs-based system for one GM plant they are likely to utilise the same system for all their research and development lines. Therefore a company could still sell and distribute commercialised seed that contained an unauthorised variety; and
- there is some evidence that even very low levels of gene flow or 'leakage' can lead to the persistence of a favourable transgene in wild populations. Therefore to prevent pollen contamination of compatible wild species, biological containment would have to be absolute.[37]

International concerns around GURTs and Terminator technology.

While these technologies are being promoted as a biosafety tool[38 39] their main purpose is an economic one - to prevent farmers from keeping seed for future use or to reduce possible liability claims for contamination, for example.[40] Their development has led to concerns being raised throughout the world.[41] In 1999, in response to an avalanche of public opposition, two of the world's largest seed and agrochemical corporations - Monsanto and AstraZeneca (now Syngenta) - publicly vowed not to commercialise Terminator seeds.[42] In 2000, the United Nations Convention on Biological Diversity adopted a de facto moratorium on Terminator seeds and this was reaffirmed by the Conference of Parties in March 2006.[43]

4.5 Discussion

This section looked at two international initiatives, the Cartagena Biosafety Protocol and the Codex Alimentarius; one national approach – that of the USDA; and two technical approaches, plastid transformation and GURTs. It is important to note that each of these initiatives signals recognition of, and is an attempt to address, a current problem with contamination. However, clear shortcomings to each approach remain.

The international agreement on the transboundary movement of LMOs, the Cartagena Biosafety Protocol, does have provisions to make some contamination (that involving the movement of LMOs between parties) illegal. However, reporting mechanisms do not currently appear to be working and there is a very real concern that developing countries may lack the capacity to undertake necessary testing.

The world's largest grower and exporter of GM crops, the United States, is revising regulations to address conditions leading to both national (e.g. creeping bentgrass) and global (e.g. LLRICE601) contamination incidents. Its approach seems to be twofold. Firstly, the USDA is attempting to reduce contamination from crops deemed to be the most risky, i.e. crops producing pharmaceutical and industrial products. However, the extent to which they will actually restrict the production of these most risky GM crops is unclear. Secondly, they will formalise contamination of the food chain by authorising low level presence (LLP) for GM plants which are deemed to be of low risk.

This approach of 'legalising' low level contamination is reflected in the US-derived proposals to the Codex Alimentarius Commission, to make widely available to other governments the information necessary to authorise such contamination once it has occurred. However, these proposals are voluntary and it remains unclear how they will be used, but clearly any such measures should not be used to undermine national biosafety legislation. Furthermore, Codex only deals with food safety and cannot address issues of environmental impact or broader socio-economic issues.

Two key technical solutions to contamination are the use of plastid transformation and GURTs. Both of these technologies are at very early development stages and even if technical problems were overcome they would only prevent some contamination incidents. Further, the power of GURTs to affect the livelihoods of large numbers of people around the world is likely to remain a considerable block to their development.

Conclusions & Recommendations

5

Products contaminated with illegal GM rice from China © Greenpeace/ Nick Cobbing

The new incidents recorded in 2007 confirm the main conclusions from the previous reviews of the GM Contamination Register. These are that:

- controls on GMOs from the laboratory to the field are ineffective and prone to failure;
- countries and companies are often unable to prevent illegal sales of GM crops. This is of particular concern for developing countries with limited scientific and regulatory capacity to monitor food, feed and seed imports;
- no control system, physical or biological, is totally foolproof - human error will always result in accidents;
- there are no independent systems in place to detect and investigate contamination, illegal releases and negative side effects of GMOs;
- national, international and corporate structures are inadequate and thus probably the majority of GM contamination incidents are undetected and certainly only a fraction of detected cases are published;
- countries are not fulfilling their obligations under the Cartagena Protocol on Biosafety to inform the Clearing House of illegal transboundary movements of GMOs;
- potentially dangerous genes could be introduced into the food chain and the environment as a result of the poor controls and lack of information because of claims to commercial confidentiality; and
- the economic costs of contamination and other incidents have been, and are likely to continue to be, large in the future. Health, environmental and social costs are potentially immense.

GeneWatch UK and Greenpeace again consider that these findings require that governments:

- require event-specific detection methods for GMOs as a prerequisite for field trials in addition to commercialisation. The detection methods and associated reference materials should be made publicly available to facilitate identification in case of GMO escape;
- urgently enforce international standards for the identification and documentation of transboundary shipments of GMOs;
- ensure that the public interest outweighs commercial confidentiality issues;
- target imports of food, feed and seed from high-risk, GM-growing countries for routine tests for GM contamination and subsequent investigation;
- deny to companies their right to commercialise GM products if the companies are involved in intentional illegal releases of GMOs or fail to cooperate in their prevention and management;
- act firmly against violators when an illegal act takes place. Without substantial and predictable sanctions, sloppy practice and complacency are likely to be encouraged;
- oblige companies to keep records of the global dissemination of their products and GMO events, and make these publicly available, as a matter of product stewardship; and
- stop all approvals and releases of GMOs under present conditions.

that the Parties to the Biosafety Protocol and Convention on Biological Diversity:

- introduce national and international rules to provide strict liability for environmental, health and/or economic damage that arises from GM contamination and illegal growing. The biotechnology company producing the GMO should be considered liable unless it can demonstrate negligence by another party. Procedures and mechanisms must be established to ensure redress, to ensure environmental damage is prevented and remedied. An international fund must be established to ensure that liability and redress is always available;
- establish an independent, international commission to investigate GM contamination and implement measures to reverse GM contamination;
- establish and maintain a global and publicly available register of cases of contamination, illegal releases and negative agricultural side-effects within the framework of the Cartagena Protocol on Biosafety (CPB); and
- ensure that the CPB Clearing House is fully informed about illegal transboundary movements of GMOs as soon as they are detected.

that companies, insurers and investment companies:

- review the potential liabilities of GMO development and sales and disclose these liabilities fully in their financial reporting.

Incidents added to the GM Contamination Register

Greenpeace activists seal off a GM papaya trial in Thailand © Greenpeace/Yvan Cohen

Note: additional documentation and references for all these cases can be found on the GM Contamination Register website at www.gmcontaminationregister.org

6.1 Austria - unauthorised LLRICE62 from the US identified

On 31 August 2007, the Austrian authorities notified the EU and its Member States that it had identified unauthorised GM Rice line LLRICE62 in products on sale in Austria.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=212&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=

6.2 Austria - LLRICE601 found

During 2007, the Austrian Authorities notified the EU and its Member States that it had identified unauthorised GM rice LLRICE601 on two separate occasions.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=211&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=

6.3 Brazil - GM cotton growing spontaneously in Parana State

In May 2007, spontaneous germination of illegal GM cotton was found in the North of Parana State, Brazil, during a regular inspection carried out by the State Agriculture Secretary. The contamination was found close to a road that connects the cities of Bela Vista do Paraíso and Alvorada do Sul. The plants found alongside the road (already flowering) were tested by the Secretary lab and found to be positive for Bt and RR varieties - both from Monsanto. Both varieties are illegal in Brazil.

According to Marcelo Silva, the agronomist in charge of the inspection, the seeds probably fell from a truck, and then naturally germinated. He stated, "This fact demonstrates the risk of proliferation of GM varieties which are not authorised". The case will now be notified to the Environmental Institute of Parana (IAP) and to the Agriculture Ministry.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=152&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=

6.4 Bulgaria – unidentified genetically modified material found in soy protein from Brazil

On 29 August 2007, the Bulgarian authorities notified the EU and its Member States that among a shipment of soy from Brazil, it had identified a DNA sequence called 35S. This is a regulatory sequence from the cauliflower mosaic virus (CaMV) and is very commonly used in GM plants. The import was therefore not allowed by the Bulgarian authorities.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=181&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=

6.5 Canada – Bayer's experimental LLRICE601 found in Canadian shops.

In November 2007, Greenpeace Canada sent rice purchased at Provigo, 50 Ave Mont-Royal in Montreal and at Buy Low Foods in the Kingsgate Mall, 370 East Broadway in Vancouver, to an independent testing facility. The presence of the experimental GM rice, LLRICE601, was found in both samples.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=158&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=

6.6 China – LLRICE601 found in Beijing supermarket.

November 2007 - Greenpeace China collected ten US food samples from two supermarkets in Beijing in August and September, and they were sent for testing at an independent laboratory in Germany. The test result showed that one of the samples, Mahatma Extra Long-grain Enriched Rice, contained a herbicide-resistant GM rice called LL601. China has not approved LL601 or any other GM rice for import or market sale.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=162&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=

6.7 Cyprus - dog food contaminated with LLRICE601

On 18 April 2007, the Cypriot authorities notified the EU and its Member States that it had found the unauthorised GM rice LLRICE601 in complete dog food imported from the US. The product was detained.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=175&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=

6.8 Cyprus - unauthorised GM rice from China.

On 22 March 2007, the Cypriot authorities reported that they had found DNA from unauthorised insect resistant BT63 rice in a 100 tonne shipment of rice protein. The genetically modified rice originated from China and had entered the EU via the Netherlands but was not detected until it arrived in Cyprus.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=174&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=

6.9 Czech Republic – LLRICE601 found in long-grain rice

On 19 April 2007, the Czech authorities notified the EU and its Member States that it had identified the unauthorised LLRICE601 in packets of long-grain rice being sold in the Czech Republic. The packets had been imported from Germany, but the rice had originally been imported into the EU from the United States via the Netherlands.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=180&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=

6.10 Finland - unauthorised GM LL601 rice found in supermarket product

In January 2007, Risofino Mexican style rice meal 160g marketed by Lidl supermarket was found to contain Bayer Crops Science's illegal LL601 GM Rice.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=171&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=

6.11 Finland - unauthorised GM maize found in cat food.

In May 2007, the Finish Food Safety Authority notified the European Commission that it had found cat food products contaminated with GM maize line DAS-59122-7, sold commercially as Herculex.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=172&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=1

6.12 France - long-grain rice contaminated

On 15 January 2007, the French authorities notified the EU Commission and Member States, via its Rapid Alert System for Food and Feed, that it had found unauthorised genetically modified rice amongst a batch of long-grain rice from the US.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=173&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=1

6.13 Germany - at least 1500 hectares planted with GM contaminated rapeseed

German authorities found GM rapeseed in conventional crops. A spokesperson for the environmental minister of North Rhine-Westphalia stated that consignments from the company Deutsche Saatgutveredlung contained seeds tolerant to the herbicide glufosinate.

Glufosinate is sold by the German company Bayer Crop Science under the trademarks LIBERTY and BASTA. About 1500 hectares have already been planted with the genetically modified crops. The origin of the contamination is unclear.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=155&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=1

6.14 Germany – GM papaya found

On 15 March 2007, the German authorities notified the EU and its Member States that it had identified unauthorised GM Papaya from the United States.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=179&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=1

6.15 Germany –unauthorised GM rice from China identified

In March 2007, the German authorities notified the EU and its Member States that it had identified unauthorised genetically modified rice amongst instant rice noodles from China.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=210&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=1

6.16 Germany - authorities confirm GM fish report

Genetically modified fish have been illegally imported into the UK, Germany and the Netherlands.

The species Danio rerio (marketed as coral pink danios) have been genetically modified to produce both a red and green fluorescent protein. They are marketed in the US as "GloFish" by Yorktown Technologies. The original parent fish were produced in the laboratories of the National University of Singapore and have an extra RFP (Red Fluorescent Protein) gene inserted into their genome from a coral which makes them "glow" pink, under certain lighting.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=215&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=1

6.17 Germany - rice contamination

In January and February 2007, the German authorities notified the EU and its Member States that they had identified the unauthorised GM rice line LLRICE601 on four separate occasions.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=209&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=1

6.18 Greece - Bt63 rice from China reaches Greece

On 21 February 2007, the Greek authorities notified the EU and its Member States that they had identified unauthorised genetically modified rice from China. The exact variety of this rice was not confirmed but it is thought to have been Bt63.

On 30 March, the Greek authorities notified the EU and its Member States that the unauthorised genetically modified rice had been found amongst rice protein concentrate from Hong Kong.

On 18 April 2007 the Greek authorities notified the EU and its Member States that the unauthorised genetically modified rice Bt63 had been identified by border controls in rice protein content from China. In this instance, Bt63 was specified.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=176&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=1

6.19 Ireland - genetically engineered maize enters EU illegally

Illegal maize entered the EU via the ports of Dublin and Rotterdam. The GM maize, Herculex Rw, produced by Pioneer/Dow Agrosciences, is approved in the US, but not allowed in the EU. The cargo in which the illegal Herculex maize was found is destined for animal feed.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=150&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=1

6.20 Italy - Chinese dumpling containing illegal GM rice seized by Italian authority

The Italian Heath Ministry informed Greenpeace that 11,880 packages of dumpling imported from China have been seized by Italian authorities after they identified the unauthorised GM rice (Bt63). The products had been manufactured in December 2006, and seized while there were in a warehouse close to Brescia (north of Italy). The Italian Authorities had also notified the contamination case via the EU Rapid Alert System for Food and Feed (RASFF).

During 2007, Bt63 was also found in Italy on the following occasions;

18 June, in rice noodles from China.

4 September, in spaghetti originating from China.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=168&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=1

6.21 Italy- authorities find illegal Herculex in cat food

In June 2007, Italian authorities notified the European Commission that it had found cat food products contaminated with GM maize line DAS-59122-7, sold commercially as Herculex.

The Maize has been modified to be tolerant to the herbicide glufosinate ammonium and contains Bt genes for insect resistance. The variety is subject to a marketing and cultivation application under the EU Food and Feed Regulation, made by Pioneer Hi Bred International and Dow Agro Sciences LLC.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=219&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=2

6.22 Italy - rice from the USA found to be contaminated by GMOs

On 7 March 2007, the Italian authorities notified the EU and its Member States that unauthorised genetically modified rice had been found among a rice shipment originating from the United States via the United Kingdom.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=178&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=2

6.23 Japan (2007) - imported oilseed rape continues to spread

The Japanese Ministry of the Environment and the National Institute for Environmental Studies (NIES) have been continuing to conduct surveys of oilseed rape (canola) populations around Japanese ports.

On July 7, 2007, NO! GMO Campaign published the findings of a survey of spilled GM canola found growing in Japan. The survey was carried out from March 2007 onwards by citizens in 43 out of the total of 47 prefectures in Japan. In total, 1617 samples were tested and of these 37 showed up as GMO positive. A similar survey was also conducted in South Korea.

The samples were collected not only around ports where canola (oilseed rape) is imported, and around factories where canola oil is extracted, as well as along canola transportation routes, but also in some urban areas and on farmland.

Oilseed rape is not cultivated much in Japan, so Japan mostly imports it from Canada and Australia. 80% of the canola imports come from Canada, and are presumably GM. Non-GM canola is imported from Australia.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=169&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=2

6.24 Japan – noodles and rice flour from China are found to be contaminated with Bt63 GM rice

According to the Chinese Ministry of Health, Labour and Welfare (MHLW) GM rice contamination was found in imported processed rice products from:

- SHANDONG JINCHENG CO., LTD. (rice noodle)

- JIANGSU BABY (GROUP) CO. (glutinous rice flour)

Ten packages (171kg) of the rice noodles had been distributed, but are now being re-called by the company. The rest did not leave the port quarantine station. The government is now checking the import reports and will be checking the products that have been distributed already by the two companies.

The food importers involved were Morii Foods and the Mitaki Company.

The Japanese Government brought the incident to the attention of the Chinese Embassy and has asked that the Chinese Government prevents such contamination in the future. China has not yet responded.

The Japanese Government has been checking processed rice products from China since September 2006. This is the first time Japan found contamination. The Japanese Government will be testing other companies' Chinese rice products as well. For the two companies in question, all their products will be checked from now on (including previously imported products). Additionally, the Japanese Government is checking Chinese rice kernel. The control started in January last year, with 370 tests carried out so far but until no other contamination has been found.

6.25 Mexico - GM maize planted illegally

December 2007. Ciudad Juarez, Chihuahua, Mexico. Although the Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (SAGARPA) had refused to believe that in Chihuahua GM maize had been sown, on 19 December, a judicial notification was sent to the farmer Amado Trevizo Nevares in Benito Juarez, located in the municipality of Namiquipa, because laboratory analysis had found that the GM maize had been growing on his land.

Trevizo is a member of the Organización Agrodinámica Nacional (OAN), a group that announced more than three months ago that there were more than 2,000 hectares of transgenic corn in the state, which was brought by relatives of migrants who work in the United States fields.

It is illegal to grow GM maize in Mexico and there are concerns internationally about GM varieties contaminating native land races there as Mexico is a centre of origin of maize.

6.26 Mexico – LLRICE601 found in Mexico

On 28 November 2006, Greenpeace Mexico announced it had found illegal LLRICE601 in Uncle Sam Texas Long-grain Rice.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=165&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=2

6.27 The Netherlands - GM ingredients found in unlabelled pet food

August 2007 - In a random test of 17 brands of pet food, Greenpeace Netherlands found eight to contain GM ingredients above the 0.9% threshold, set by European law demanding labelling of GM products. None of the products were labelled as containing GM ingredients and were therefore in violation of the law.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=167&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=3

6.28 The Netherlands - Genetically engineered maize enters EU illegally

Illegal maize has entered the EU via the ports of Dublin and Rotterdam. The GM maize, Herculex Rw, produced by Pioneer/Dow Agrosciences, is approved in the US, but not allowed in the EU. The cargo in which the illegal Herculex maize was found is destined for animal feed.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=220&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=3

6.29 The Netherlands - authorities confirm fish report

Genetically modified fish have been illegally imported into the UK, Germany and The Netherlands.

The species Danio rerio (marketed as coral pink danios) have been genetically modified to produce both a red and a green fluorescent protein. They are marketed in the US as “GloFish” Yorktown Technologies.

The original parent fish were produced in the laboratories of the National University of Singapore and have an extra RFP (Red Fluorescent Protein) gene inserted into their genome from a coral which makes them "glow" pink, under certain lighting.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=216&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=3

6.30 New Zealand – biosecurity officers seize 300 GM fish in Christchurch

Biosecurity New Zealand has urged tropical fish collectors and breeders to help trace genetically modified fish that had been imported illegally.

Ministry of Agriculture and Fisheries (MAF) officers seized and destroyed 300 tropical fish in raids on two Christchurch pet shops and two private premises in Christchurch in July 2007.

Biosecurity NZ incursion manager David Yard said the operation involved seizing and humanely euthanasing the fish after tests done in Britain confirmed they had been genetically modified with a red fluorescent protein to make them a bright red/pink colour.

Biosecurity was alerted ”several weeks ago” by concerned members of the public who noticed the zebra danio fish, a breed popular with ornamental fish enthusiasts, for sale on the internet.

It was thought the fish were either part of, or bred from, a consignment of about 400 red danio that were imported from Singapore in January this year and cleared by the Quarantine Service.

”The fish in question were cleared for entry at the time, due to an incorrect declaration by the importer who believed they were dyed red, rather than genetically modified,” Yard said.

”The importer’s belief they had been dyed was supported when the fish were examined under ultraviolet light and did not fluoresce or glow as is typical with this type of genetic modification.”

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=156&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=2

6.31 Peru – illegal genetically modified maize found

Research conducted at the Universidad Nacional Agraria, Lima, Peru, using PCR analysis claims to have found maize lines NK603 and Bt11 growing in the Barranca valley.

Peru's has implemented the Cartagena Protocol on Biosafety and has not authorised any of these maize lines. The author therefore claims this to be illegal contamination.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=182&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=2

6.32 Romania - GM soya still being grown

In October 2007, the Romanian National Environmental Guard announced that it had discovered 290 hectares of GM soy being illegally cultivated in Batar in the county of Bihor at the border with Hungary.

Monsanto's Roundup Ready soybeans have been planted in Romania since 1999, but when they joined the EU in 2007 that cultivation became illegal. Monsanto do not have a licence to grow GM soybeans in the EU.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=221&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=2

6.33 Sweden - LLRICE601 found in long-grain rice

On 28 February 2007, the Swedish National Food Administration announced that it had found traces of unauthorised LL601 rice had been found in 600 metric tonnes (30 containers) of pre-packed long-grain rice imported from the United States.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=177&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=2

6.34 Sweden - unapproved GM rice Bt63 contamination

Tests of eighteen foods imported from Asian countries collected in Stockholm, Sweden, revealed unapproved GM rice in one product, a rice noodle from China. The tests were conducted by the City of Stockholm's Environment and Health Administration (miljoforvaltningen i Stockholm) and revealed the presence of a Bt toxin gene which makes GM rice resistant to insects. The importer, Hong Kong Trading in Stockholm, immediately recalled the suspected products, and the National Food Administration reported the matter to the EU via the Rapid Alert System for Food and Feed (RASFF).

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=157&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=2

6.35 Thailand - GM maize contamination despite no commercial growing or field trials in the country.

Genetically-modified maize has been found at a local farm near agribusiness giant Monsanto's maize farm in Phitsanulok province.

The contamination was exposed by Biothai, a non-government organisation working on organic farming. The group collected 19 samples of maize, soybean and cotton from local plantations and farm shops in Phitsanulok, Nakhon Sawan and Sukhothai late last month and sent them for testing at Chulalongkorn University's food research and testing laboratory.

Test results of the first two samples, collected from a deserted farm in Phitsanulok's Wang Thong district, confirmed they are GM maize, said Biothai director Witoon Lianchamroon. Results of tests on the remaining samples were expected to arrive soon, he added.

According to the Agriculture Department's records, Monsanto obtained permission to import five kilogrammes of the maize from the US in 1999 to plant on an isolated farm for experimental purposes.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=170&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=3

6.36 UK - unauthorised GM in rice protein for animal feed

April 2007, the UK's Food Standards Agency (FSA) reported that the unauthorised Bt63 rice had been found in animal feed imported from China via the Netherlands.

Thursday 26 April 2007 - Animal feed containing unauthorised GM in rice protein has been imported into the UK via the Netherlands.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=151&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=3

6.37 UK - authorities confirm GM fish report

Genetically modified fish have been illegally imported into the UK, Germany and the Netherlands.

The species Danio Rerio (marketed as coral pink danios) have been genetically modified to produce both a red and green fluorescent protein. They are marketed in the US as "GloFish" by Yorktown Technologies. The original parent fish were produced in the laboratories of the National University of Singapore and have an extra RFP (Red Fluorescent Protein) gene inserted into their genome from a coral which makes them "glow" pink, under certain lighting.

The sale of the fish was first reported in the UK by Practical Fish Keeping magazine in June 2006. When it was reported that shops were selling the fish as genetically modified, but it was thought that they were more likely to be dyed as no GM fish has a marketing license in the EU.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=154&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=3

6.38 USA - organic maize seed contaminated

Fedco Seeds (a Maine based organic seed company) has been testing its sweet corn seed for GMO contamination for the last seven years. Until recently all tests were negative but in autumn 2007 routine testing returned one batch with trace levels of contamination - below 0.01% (1 kernel in 10,000).

Fedco responded by sending three additional lots from the same supplier for further testing. This time, one test was negative, a second for showed trace indications of contamination, and a third, tested positive for GMO presence just above the detectable limit. Fedco removed the seeds from sale

6.39 USA - US Department of Agriculture stops planting and distribution of contaminated long-grain rice.

On 5 March 2007, the USDA issued the following statement:

"The US Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) is taking action to prevent the planting and distribution of a long-grain rice seed known as Clearfield CL131 because testing by a private company has revealed the possible presence of trace levels of genetic material not yet approved for commercialization.

"APHIS began issuing emergency action notifications (EANs) yesterday, March 4, to inform distributors that the seed, scheduled for planting this spring, must be held until APHIS can verify and identify the presence of additional genetic material. APHIS directed distributors to begin notifying producers yesterday. Additional EANs are being issued to affected producers as they are identified.

The USDA has now confirmed that Clearfield rice had become contaminated with Bayers' LLRICE604. This is another unapproved variety similar to the GM variety LLRICE601 that caused widespread contamination of the global rice supplies in 2006.

http://www.gmcontaminationregister.org/index.php?content=re_detail&gw_id=147&reg=0&inc=0&con=0&cof=0&year=2007&handle2_page=3

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