GM Contamination - imports of food and feed at risk

Measures needed to reduce the threat

GM FREEZE
the campaign on
GM food, crops and patents

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Executive Summary

GM contamination of food and feed crops around the world is increasing. Two most recent incidents, involving maize and long grain rice from the USA, arose from the cultivation of GM crops experimentally. Over 170 species have been genetically modified and tested in the open. Contamination can arise from cross pollination and co-mingling of GM and non-GM crops at any stage of the supply chain from seeds to storage/transport containers.

This report identifies which crops and from which countries, imports into the UK are the highest risk of GM contamination. The analysis is based on the presence of commercial GM production, the number and extent of GM test sites, the chances of cross pollination in the field and the volume of imports. It highlights the need to improve independent gathering of data to ensure that changes in the risk of contamination are identified quickly.

At present, maize from the USA, South Africa and Europe and rice from China and the USA represent the biggest risk of GM contamination. However, contamination of any crop which has been genetically modified cannot be ruled out. The growing and testing of GM crops to produce pharmaceuticals and industrial chemicals create new contamination risks with very significant public health implications.

The report makes a series of recommendations that the EC and Food Standards Agency should adopt to minimise the risk of costly contamination incidents in the future. A key demand is that there is greater international co-operation to inform importing countries of what crops have been modified and tested in the field and full access to materials that would allow testing for their presence in cargoes entering the EC and UK. Another important aspect will be the identification of the GM nature of incoming cargoes before they are allowed to leave port to reduce the chances of costly recalls of feed and feed already on the market. There is also an overriding need to make this information and skills accessible to all countries who import food and animal feed. The report recommends that the EC support poorer countries to develop laboratories and train staff to the level required.

1. Introduction

Contamination of staple human foods and animal feed with genetically modified organisms (GMOs) is on the increase. A number of high profile incidents occurred in 2005 and 2006 leading to costly monitoring, product withdrawals and on-going litigation. Maize for animal feed and long grain rice intended for human consumption were both contaminated with experimental GM traits in the USA, which led to GM contamination of both being detected in most continents. In the wake of these significant events, GM Freeze undertook research to assess the likely risk of future contamination of UK food and feed from GM crops grown commercially and experimentally, including those engineered to produce pharmaceutical products. Despite the fact that the notification of GM test sites around the world is not always reliable, and our limited resources, GM Freeze has been able to highlight likely sources of GM contamination that are a threat to the integrity of our food and feed chains. This report details our research findings and sets out a number of recommendations on measures the EU and UK government should take to minimise the chances of future contamination incidents and thus allow consumers and farmers the right to buy food and feed with no detectable GM presence.

2. Background – contamination and ineffective testing

The area of GM crops being grown commercially increasess every year. However, the main commercial cropping is limited to four crops (soya, maize, oilseed rape, and cotton) incorporating only two traits (herbicide tolerance and insect resistance) in four main countries (USA, Canada, Argentina and Brazil).
The outdoor testing of GM crops is far more widespread involving over 170 plant species. The USA is the most intensive area for field testing GM crops both in variety of species and different traits.

Containment of GM traits within GM crops has proved to be very difficult to achieve in practice. The wind, thermals, insect pollinators and human error and carelessness can spread GM traits far from their original source, creating economic disruption and potentially significant public health and environmental problems. The physical and biological nature of pollen movement, and the wide range of possible ways GM seeds could be mixed with non-GM ones, means that containment is very difficult unless the strictest segregation and handling of GM crops and seeds are followed. GM contamination can soon become a global problem if basic errors are made, as recent events have demonstrated. The seed, food and feed industries are global enterprises, and the large amounts invested in developing GM crops means that high sales volumes are essential to meet the expectations of investors. The combination of all these

factors makes GM contamination incidents more and more likely to happen.

The GM contamination of cargoes causes problems because it may involve the illegal sale of a genetically modified organism, or it may mean that consumers and farmers unwittingly purchase products with a GM content which is unlabelled against their wishes or those of their customers. Under EU GMO legislation, GMOs have to pass through a risk based approval system under EU Regulation 1829/2003 before they can be legally sold in the Member States. Any presence of a GMO which has not been approved in food or feed is therefore illegal. Any presence of approved GMOs in food and feed above a threshold of 0.9% (just under 1%) has to be labelled. Below this level labelling can only be avoided if the GM presence can be shown, by means of traceability measures, to be adventitious or technically unavoidable (ie accidental). Regular contamination of non GM imports, even with approved GMOs, would erode the consumers' and farmers' right to avoid.

The alarming prospect is that the next generation of GM crops - "biopharms", or plants engineered to yield pharmaceuticals - could similarly escape and find their way into the food or feed supply. GM crops are also being developed to produce chemicals for industry and biofuels which may also pose risks to public health if contamination of food took place.

In its October 2006 report[1] on the implementation of the labelling and traceability regulations[2] for genetically modified food and feed, the European Commission analysed three cases of unauthorised GM products that illegally entered the EU:

- Unauthorised GM papaya from Hawaii was detected by German authorities on seven occasions in 2004.

- On 22 March 2005 the Commission was informed by the US mission to the EU of the accidental release in the USA of the unauthorized GM maize Bt10 (developed by Syngenta) being sold commercially as the approved line Bt11. This was three months after the company responsible for the commercialisation of the product had notified the US Government of the contamination. At the time the US authorities confirmed that maize products contaminated with Bt10 were likely to have been exported to the EU since 2001, and it was probable that such exports were still continuing. This proved to be the case with contaminated cargoes imported into Japan as well as the EU.

- In January 2006 global rice supplies were contaminated with Bayer CropScience's unapproved GM variety LLRICE601 (tolerant to the herbicide Liberty) (see case study below).

Case Study LL601 Rice

This variety had not been developed for commercialisation and had not progressed beyond field trials that ended in 2001. However, it was still found throughout the rice growing areas of the USA in one of the most commonly used conventional varieties, Chenier. By the time the US regulators announced the contamination on 18th August 2006, contaminated rice was already in the food chain all around the world. Contaminated stocks had to be removed from supermarket shelves in many countries, and almost without exception these countries have banned further imports of US long-grain rice supplies unless proven to be GM free. The price in the USA fell, and there are now 15 court cases pending[3] as growers seek to obtain compensation from Bayer for financial damages.

The story doesn't stop there. In March 2007 a second GM rice contamination incident was reported in the Southern states of the USA, this time involving the Bayer CropScience variety LL62. Animal and Public Health Information System (APHIS)[4] stepped in and ordered farmers not to plant Clearfield 131 rice anywhere in the Southern states, in spite of the fact that there will now be severe shortages of seed stocks for the 2007 rice growing season. It appeared that there was widespread contamination in seed stocks from 2005 and 2006, meaning that the contamination dates back to at least 2004.Testing labs have now found an unidentified LL contamination of Clearfield 131 that is not LL06, LL62 or LL601, the only three varieties deregulated (ie, authorised) in the US. This means that the contamination is from one (or more) of the other discontinued or experimental lines abandoned by Bayer probably at least a decade ago. BASF (breeders of both the non-GM Clearfield 131 variety and GM crops) is now experiencing damage to its own business because of this, and the company is trying to obtain from Bayer the genetic makeup of all of these abandoned GM-LL varieties so that contaminated stocks can be found, impounded and destroyed.

In addition, Bt GM rice from China was detected in specialist Chinese food imports in the UK, Germany and France by Greenpeace and Friends of the Earth in 2006.[5] It was reported that the unapproved Bt rice had been grown illegally in China.

The European Commission concluded its report with a warning that the possibility of unauthorised GM products arriving at the doors of the EU cannot be excluded. The EC insisted that:

"*...preventing the import of unauthorized GM product into the EU market implies a high degree of vigilance from operators and Member States in order to detect at an early stage any unauthorized product that might be placed on the EU market. It also requires prompt information from the companies responsible for the concerned GMO and, from the exporting country where the contamination is firstly reported. Overall, better international cooperation is urgently needed*."

After ten years of commercial planting of GM crops there is still no global monitoring scheme on their impact on food production and the environment. Because of this failure, GeneWatch UK and Greenpeace started a global register[6] showing incidents where GM organisms had been found to contaminate non-GM crops and the food supply. By 2006, they had reported a total of 142 incidents. 2006 was the worst year for contamination and so far with 24 recorded incidents of contamination or illegal presence compared with 20 in 2005, 21 in 2004 and 10 in 2003.[7]

A common problem with both the Bt10 maize and LL601 rice contamination incidents was the unavailability, in the early stages, of the GM reference materials needed to allow testing to take place. In addition both Syngenta and Bayer only released the materials to a limited number of laboratories in the EU, which had the effect of limiting the rapidity of any testing carried out by member states and of reducing its scope.

Despite the new commitment of the European Commission to prevent the import of unauthorized GM product into the EU market, as well as the mounting threat of pharmaceutical genes in food crops, the UK authorities only made a partial response to the EU's Emergency Decision[8] to deal with LL601 rice contamination in August 2006. Friends of the Earth sought a Judicial Review of the Food Standards Agency (FSA) handling of the LL601 rice incident. Although the judgement found that the FSA had not acted illegally, the judge did highlight a number of errors, including the failures both to issue Food Alerts and to keep local authorities informed of the action required to comply with EU measures. In court, the FSA undertook to conduct an internal review of their handling of LL601 rice. However, it remains to be seen how transparent and effective this review will be.

The February 2007 Central Science Laboratory report, commissioned by the DEFRA, raised important points about sampling protocols. The report[9] suggests that the reliability of current sampling methods for testing of large cargoes of soya beans for GM content is strongly affected by sampling uncertainty. The results show that sampling protocols based on the assumption that GM is distributed randomly in a cargo do not give a true result for the GM content overall. These results demonstrated that there are hot spots in every cargo which could be missed if the sampling protocol is based on a random distribution theory. This will impact on monitoring costs at ports and can only be solved by better controls at the supply end, including proper segregation of GM and non-GM from seed production to port of export. The EU and Member States cannot ignore this because of the threat of pharmaceutical genes entering the food and feed chain.

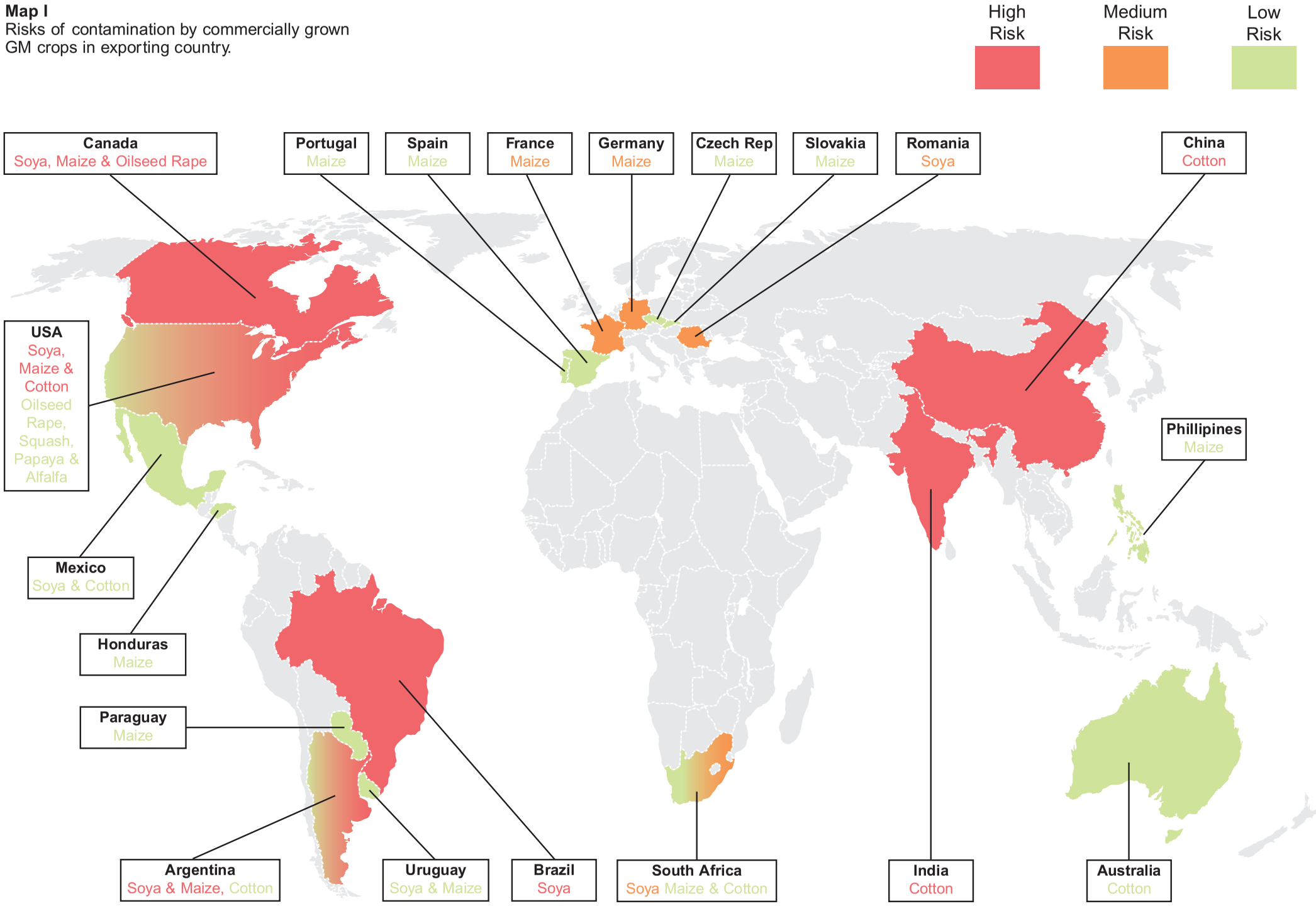
Pharma crops in our food?

Genetic modification of crop plants to produce a variety of pharmaceutical products has been under development for many years. The advantage of using GM plants, rather than GM micro-organisms, is that production costs are lower. Plants can be modified to produce vaccines, antibodies and therapeutic proteins, but currently there are no drugs licensed to be produced from GM plants. However, GM plants are being used commercially to produce proteins for research and diagnostics.[10]

Field trials have been conducted in the USA, Canada and Europe since the mid 1990s, and contamination could arise from cross pollination to neighbouring food and feed crops or from accidental mixing. A variety of crops have been tested including maize, soya, tomato, aubergine, oilseed rape (canola), clover, white mustard, melon, rice, wheat, sugar cane, alfalfa, field pea and barley. Tobacco and safflowers are the only non-food crops to feature in outdoor trials. In Europe, France is the main country pursuing such trials, growing GM tobacco and maize and licensing further trials in 2006, after a break of 5 years.[11] Italy and Spain have also conducted outdoor trials. In the USA, GM pharma crops have been extensively tested in the open:

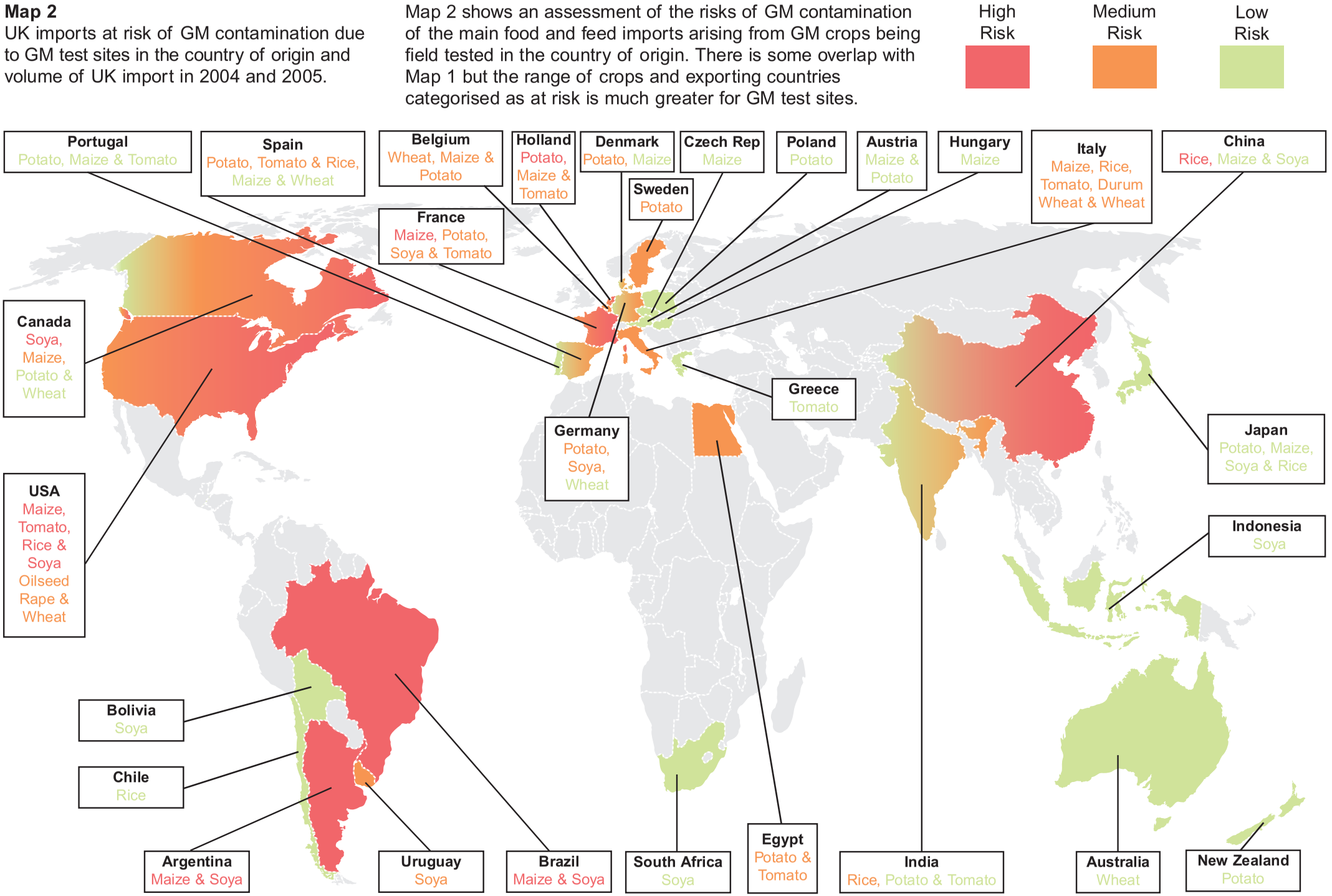
"*Since 1991, USDA has received 240 requests for 418 field releases of crops engineered to produce pharmaceuticals, industrial chemicals, or other so-called biopharmaceuticals; the number of requested field releases of "biopharm" crops increased from 22 in 2003 to 55 in 2004.*"[12]

Map I
Risks of contamination by commercially grown GM crops in exporting country.



Map 2
UK imports at risk of GM contamination due to GM test sites in the country of origin and volume of UK import in 2004 and 2005.

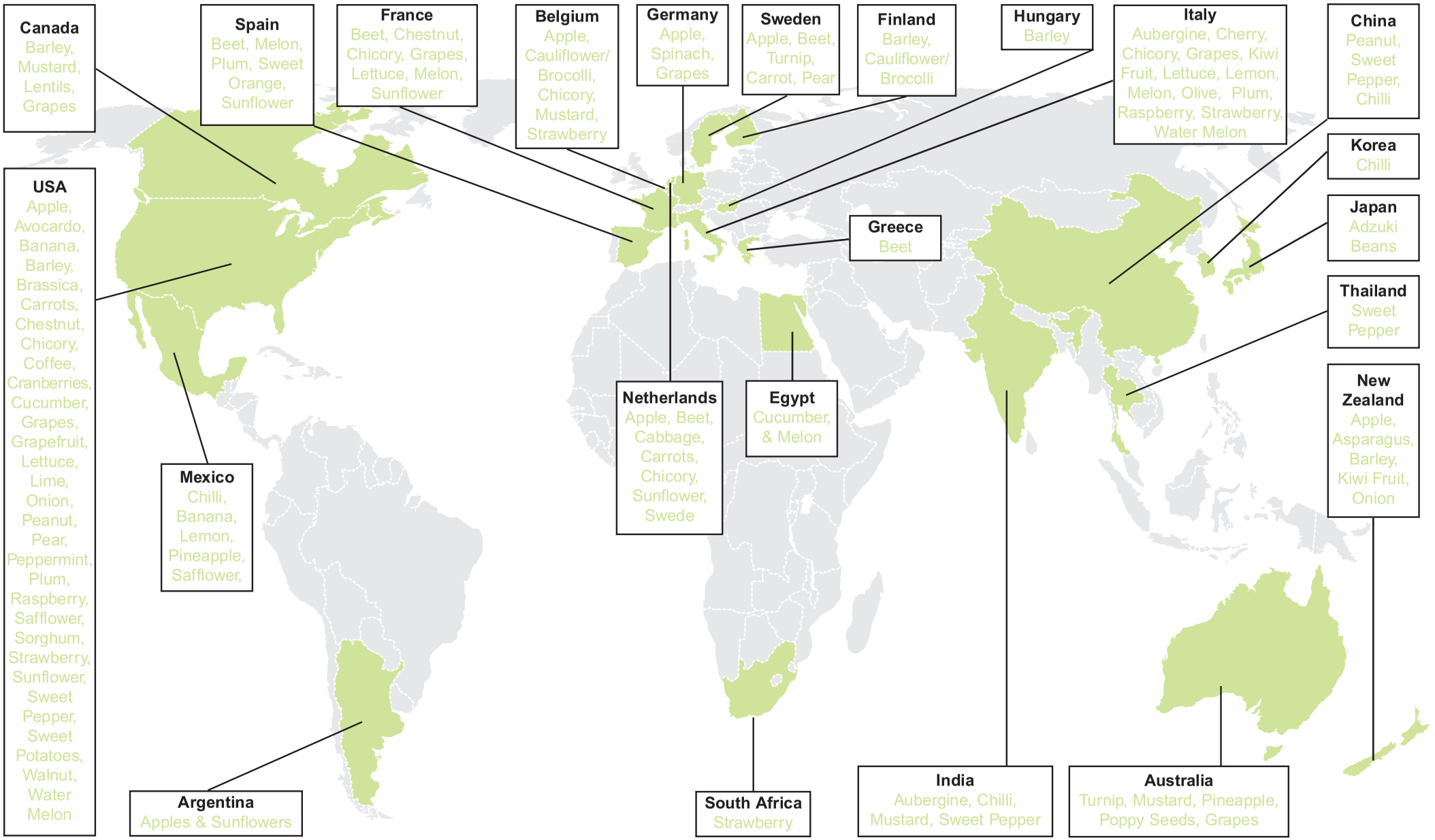
Map 2 shows an assessment of the risks of GM contamination of the main food and feed imports arising from GM crops being field tested in the country of origin. There is some overlap with Map 1 but the range of crops and exporting countries categorised as at risk is much greater for GM test sites.



Map 3
UK minor food and feed imports at risk of GM contamination from exporting countries where GM field test have been carried on a small scale.

Map 3 shows UK more minor food and feed imports from a range of countries where there have been GM field tests, but where the risk of contamination is considered to be low at present because of the small number of test sites and/or lower volume of exports to the UK. It is important that GM cultivation around the world is constantly monitored and the list of "at risk" imports is updated.

High Risk | Medium Risk | Low Risk

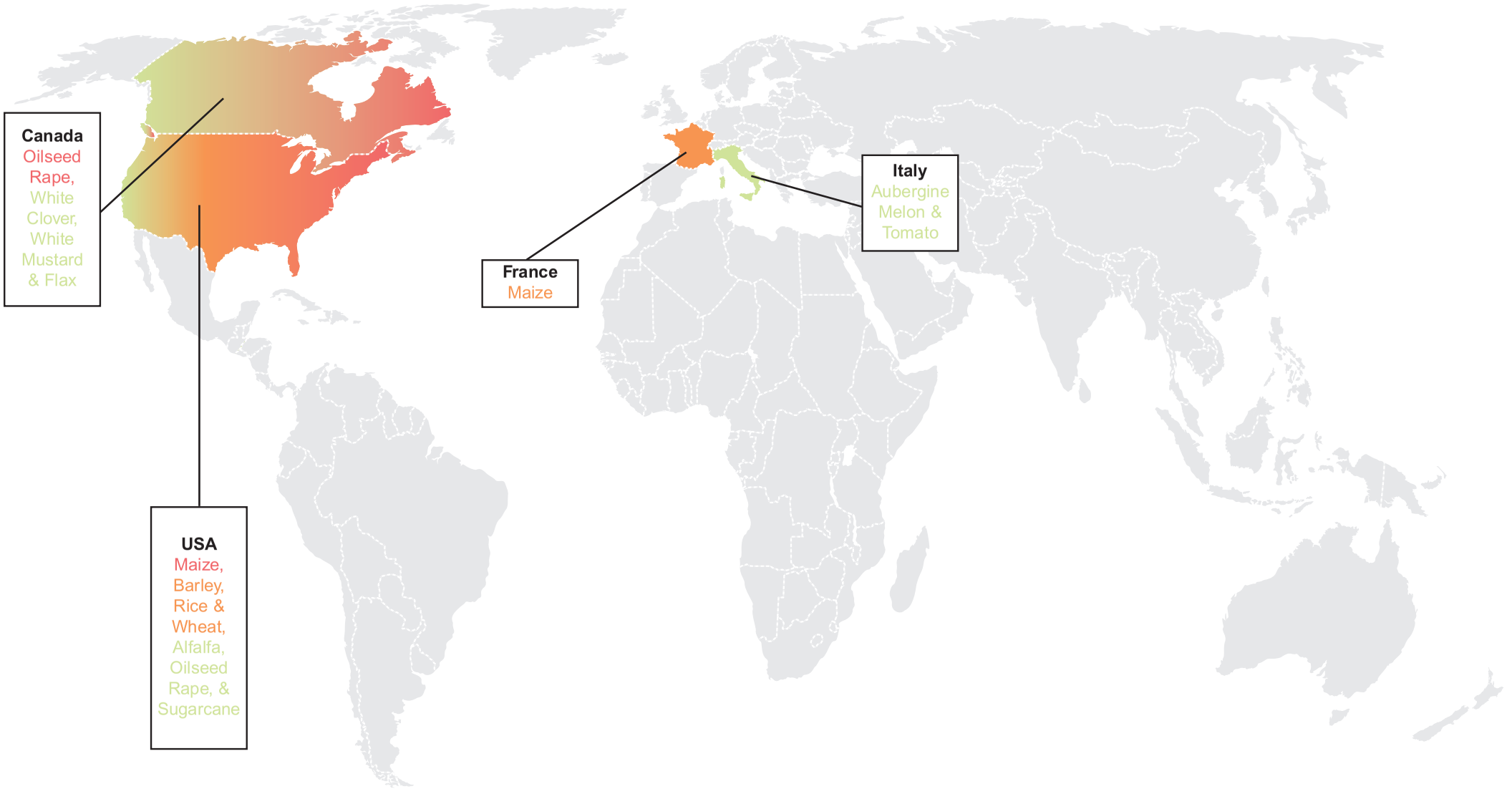


Map 4
UK imports at risk of contamination by GM pharma crops.

***NB** GM pharma tobacco has also been tested in the USA and EU and Safflower in Canada and South Africa.*

Finally Map 4 shows the UK import crops from countries where GM pharma crops have been field tested and an assessment of the level of risk of contamination for UK imports. In the case of pharma crops the chances of GM contamination incidents are considered to be lower that GM traits developed for food and feed crops. The areas grown remain relatively small in comparison to GM crops tested and commercially grown for food. However the Prodigene incident in 2002 provides a stark warning that contamination can arise in many different and unexpected ways.

High Risk | Medium Risk | Low Risk



In 2005 and 2006 a further 280 acres of pharma and industrial crops were grown in the US.[13] In 2006 Ventria Biosciences announced the development of a GM rice containing human genes to produce antibacterial compound for use in anti-diarrhoea medicine.[14]

Iceland has conducted limited trails using barley in 2003-06 which are scheduled to increase in size from 2007.[15] Canada has conducted Pharma crop trials since 1994, peaking at 16 releases in 2003. The University of Calgary followed a high risk strategy of using oilseed rape of canola for pharma crops between 1998 and 2004.[16]

GM pharmaceutical crops have already contaminated the food chain. A warning of future problems was revealed in 2002 when GM maize containing genes to produce a vaccine for transmissible gastroenteritis vaccine in pigs (developed by Prodigene) was found to have contaminated a soya crop destined for human food and animal feed.[17]

The Union of Concerned Scientists is calling for a ban of the insertion of pharmaceutical genes into food crops in the USA.[18] However at present the stream of pharma modifications in food crops shows no sign of abating.

3. Methodology

To asses the risk of non-GM crop imports being contaminated, GM Freeze used two sources of information: a Defra report on biological containment of GM traits[19] and Defra's statistics on food imported by the UK between 2004 and 2005. The Defra report included a list by species and locations of GM field trials around the world as of 2005. In all, 172 plant species have been genetically modified and are therefore a contamination risk. This report focuses on food/feed plants. As far as possible other sources of information on GM crop trials around the world were also checked to try and ensure the most up-to-date information was used.

Data from 2004 and 2005 on the quantities and origins of UK imports of food and feed crops which have genetically modified varieties were obtained from Defra's Department of Statistics. For each food/feed, a variety of forms (eg, whole fruits, juice and cut pieces) was included. This enabled us to match imports against countries growing GM varieties commercially or on test sites.

The origins of import and tonnages allowed the food and feed imports most at risk of contamination to be identified. For some species which have been genetically modified import data was not available, indicating no trade was taking place for these particular foods. For example, GM oats grown in the USA have a low risk because the UK does not import oats from the USA, where in any case very few GM test sites have been grown. In contrast, USA maize is a high risk because both GM and pharma maize are widely tested and, in the case of the former, grown commercially over a large area.

The Defra report on biological containment listed seven major food crops which had been most extensively tested and therefore were more likely to have caused GM contamination.[20] GM Freeze also carried out additional searches on country-specific data on GM field trials, when available, for each exporting country. The bulk of this information came from the EC GMO Compass, OECD's Biotrack Database of Field Trials and the 2005 TexPIRG Education Fund Report. Other data was sourced from national government websites in the exporting country or, in many cases, by the USDA. For a full listing, see the report annexes available at:

http://www.gmfreeze.org/uploads/GM_contamination_methodology.pdf

The quality of information publicly available makes it difficult to provide a comprehensive analysis of imports at risk of contamination. This is something the EU would be in a strong position to address during international negotiations and meetings.

For imports data, Defra's statistics department works to a standard set of international trade codes.[21] The broad nature of these international trade codes sometimes make it difficult to assign a code to a particular product and hence check to see the level of imports, for example watercress is included in a general code covering many different vegetables from the same family. Another difficulty in assessing the risk of GM contamination was the lack of up-to-date and reliable information on field trials from big food exporting countries such as Brazil, China, Thailand, Mexico and The Philippines. Information about GM test sites is usually limited to what GMO was released and not necessarily how many different test sites were authorised, what size they were and where they were located. All these pieces of information would be valuable in assessing the risk of contamination of non-GM and organic crops. This provides an excellent argument for mandatory registers of GM test sites in all countries giving their size and location.

The validity of some of the data for commercially grown GM crops has been questioned. One source

is the annual briefing on commercial growing produced by the International Service for the Acquisition of Agri-biotech Application (ISAAA)[22] funded by industry. ISAAA data on the extent of GM maize growing in the Philippines and areas of commercial growing in the USA have been challenged.[23] The International Rice Research Institute have been reported to have questioned the ISAAA's report of the commercial cultivation of GM rice in Iran.[24]

Despite these limitations, GM Freeze is confident that our analysis of which food and feed imports are at risk of GM contamination is sufficiently robust to provide a basis for the development of future prevention policy by the European Union and the Food Standards Agency. There is a clear need for GM Freeze's analysis to be regularly updated, refined and publicised if the level of protection required to prevent the illegal import of GMOs and provide accurate labelling are to be achieved.

4. Assessing Risk of Contamination

In assessing which food and feed imports were most at risk of GM contamination the following factors were taken into account:

- Was the imported crop grown commercially as a GM variety in the country of origin?
- Was the imported crop cultivated in GM test sites in the country of origin?
- What area of GM cultivation had taken place (not always available in the case of GM test sites)?
- What volume of the crop was imported into the UK?
- Was there a previous record of contamination involving the crop or the country of origin?
- What is the risk of GM contamination through cross pollination in the field?

Based on the data available the risk of GM contamination was characterised as high, medium or low. For instance, maize grown in the USA is rated high risk because of the large area of commercial growing, many test sites, capacity to cross pollinate in the field and record of previous contamination. In contrast, France was rated medium risk despite the large volume of maize imports because GM cropping and test sites are comparatively low at present. However, the experience of the LL601 rice and Bt10 cases in the USA in which the problems appear to have arisen from limited field trials several years prior to the detection of the unapproved traits in commercial products clearly shows that contamination can never be ruled out if any GM crops are being grown for whatever purpose.

5. Imports at risk of contamination

This section highlights the crops at highest risk of contamination by commercial GM cultivation in their country of origin (Map 1). A limited number of GM crops can legally be marketed in the UK under an EU approvals system (maize, soya and oilseed rape) and all food and feed products containing them or produced from them are required to be labelled if the GM content exceeds 0.9%.[25] At present organic products should not contain detectable GM presence although there are EU proposals to harmonise the organic with the non organic GM threshold at 0.9%. However, this proposal was rejected by a European Parliament vote in March 2007. The presence of other GM crops, without an EU marketing consent, would be illegal in imported food and feed.

6. Conclusions and Recommendations

Experience shows that contamination of non-GM crops with GM traits is on the increase. This poses a threat to the non-GM status of many food companies and their suppliers and to consumer choice. It has already led to huge and growing costs both to purge the food/feed chains of GM presence or in legal fees, as farmers and companies seek compensation for loss of income or damage to reputation from companies thought to be responsible for the contamination.

GM Freeze's preliminary analysis of where the risk of contamination is greatest points strongly to the big food/feed exporting countries that have already commenced commercial growing of GM crops or conducted extensive field trials. However, as the LL601 rice and Bt10 maize cases in the USA show, contamination can arise from relatively limited experimental cropping areas. Human failing as well as cross pollination can play a part in causing GM contamination. It is reasonable to assume that where GM crops are grown for whatever reason some risk of contamination will always be present.

Maize from the USA, South America and parts of the EU probably represents the greatest risk of contamination at present, including with pharma genes. Rice is also a major threat despite the fact that no GM rice is approved for import into the EU at present and none is grown commercially in the USA or Far East. This is

because of GM trials in USA, and India and from illegal commercial cultivation in China.

Most UK consumers are not willing to accept GM ingredients in food and most want to be able to choose, through clear labelling, whether to consume animal products reared on GM feed.[26] The presence GM contamination involving EU approved GMOs represents a significant threat to the right to avoid GM ingredients, but any presence of unapproved GM traits is strictly illegal. The majority of retailers, who took quick action to remove long grain rice during the LL601 contamination incident of 2006, have demonstrated their desire to uphold that right. However, the steady rise in the number and area of GM crops in countries from which the UK (and EU) import food/feed will undermine their ability to sustain their non-GM policies unless tight controls are maintained on imports. The continued use of food crops for GM pharma crops brings the constant threat of a serious contamination of food or feed, which could escalate into a serious public health crisis as well as a very expensive clean-up operation.

The EC has recognised the problem of contamination and rightly categorised it as an international problem. In 2005, GM Freeze put forward twelve recommendations[27] aimed at preventing GM contamination of food and feed and ensuring GMO labelling was accurate. Experiences since that report was published have led us to refine our recommendations and call for purposeful action at UK and EU levels:

1) The EU should introduce a revised Regulation to ensure that only approved GMOs enter the EU and that all food and feed is accurately labelled. This should include measures which require:

- All Members States to establish a single competent authority for monitoring incoming food, feed and biofuel cargoes and enforcement of GMO traceability and labelling.

- Any Member State found not to be reaching the required standard of enforcement of the GMO traceability and labelling regulations should certify the GM content of any exports to other Member States.

- Biotechnology companies should be legally obliged to provide analytical methods and reference materials for all the GM traits they have released anywhere commercially or experimentally as a pre-condition for receiving marketing or experimental consent for a GMO in the EU.

- The EC to establish a unit to monitor development in new GM traits and new GM crops around the world to ensure the up-to-date "at risk" list of imports plus their reference materials are available to all competent authorities and EU approved laboratories at all times.

- The production of a publicly accessible and searchable website to allow food and feed companies access to this information. This would help target their own monitoring and enforcement and assist in reducing costs across the board from conducting duplicated research.

- All incoming cargoes comprising of crops which have been genetically modified in the country of origin should be held at the port of entry until proven to be an approved GMO or non-GM in content.

- The EC's Reference Laboratory to develop legally binding sampling protocols to ensure that of GM contents in cargoes can be assessed with the highest possible certainty.

- Cargoes containing unauthorised traits should be returned to the country of origin at the exporter's expense.

- Competent Authorities in Member States should submit an annual monitoring plan for the enforcement of the GMO Traceability and Labelling Regulation to include random checks on retail, mass catering products and animal feed samples to ensure that labelling is accurate and companies are keeping the required traceability paper trail. Monitoring plans must be comprehensive and not targeted at any sector (eg those labelled organic or GM-free).

- Biotechnology companies whose GM traits cause contamination should be strictly liable for any harm arising from the contamination to health, the environment or the economic harm.

- Member States to prepare an annual report on the enforcement activity they have taken within six months of the year end, to send it to the EC and to make it publicly available via the internet at the same time.

In the absence of collective action at EU level the UK should implement the above measures as soon as possible.

2) In addition, the EU should:

- Negotiate a new clause in the Cartegena Protocol (Biosafety Protocol, BSP) at the COP/MOP4 in Bonn in May 2008 to establish an international register of GM traits for all crops which are being field tested or commercially grown anywhere on the planet. This information should be available, along with the appropriate reference materials, to any Party to the BSP.

- Negotiate a ban on the genetic modification for pharmaceutical production in food crops at the COP/MOP4 of the BSP in Bonn in May 2008.

- Provide financial and expert assistance to enable all Parties to the BSP to monitor incoming cargoes for any GM trait included on the international register.

- Negotiate a legally binding international regime that ensures strict liability for damage caused by GMOs at the COP/MOP4 of the BSP in Bonn in May 2008

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Cover photograph courtesy of USDA.

Footnotes

1 European Commission, 2006. REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT on the implementation of Regulation (EC) No 1829/2003 of the European Parliament and of the Council on genetically modified food and feed. Com(2006) 626 final

2 EU Regulation 1830/2003 concerning the traceability and labelling of GMOS and food and feed produced from GMOs amending Directive 2001/18.

3 Washington Post, 22 November 2006 http://www.washingtonpost.com/wp-dyn/content/article/2006/11/21/AR2006112101265.html

4 APHIS Program Announcement: http://www.aphis.usda.gov/publications/biotechnology/content/printable_version/ia_ge_rice.pdf

5 http://www.foe.co.uk/resource/press_releases/illegal_gm_rice_found_in_u_05092006.html

6 The GM Contamination Register is now listed as a Biosafety Information Resource on the Biosafety Clearing-House - established by the Biosafety Protocol as part of the clearing - house mechanism of the Convention on Biological Diversity. Available from: http://www.gmcontaminationregister.org/index.php?content=default

7 http://www.genewatch.org/uploads/f03c6d66a9b354535738483c1c3d49e4/gm_contamination_report_2006.pdf

8 Commission Decision (2006/578/EC)of 23 August 2006 on emergency measures regarding the non-authorised genetically modified organism LL RICE 601 in rice products (notified under document number C(2006) 3863)

9 Paoletti, C., Heissenberger, A., Mazzara, M., et al. (2006) Kernel lot distribution assessment (keLDA): a study on the distribution of GMO in large soybean shipments. Eur. Food Res. Technol., February. Available from: http://www2.defra.gov.uk/research/project_data/

10 Mayer S, 2003,. Non-Food GM Crops: new Dawn or False Hope? Part 1:Drug Production. GeneWatch UK 2003.

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12 TexPRIG Education Fund 2005. Raising Risk; Field Testing of Genetically Engineered Crops in the USA. April 2005

13 http://www.aphis.usda.gov/brs/ph_permits.html

14 http://www.washingtonpost.com/wpdyn/content/article/2007/03/01/AR2007030101495_pf.html

15 Bauer Andreas, 2006, Pharma Crops: Stae of Filed Crops Worldwide. Updated February 2006. Available at; http://www.gmwatch.org/p1temp.asp?pid=83&page=1

16 Ibid

17 http://www.aphis.usda.gov/lpa/news/2002/11/prodigene.html

18 http://www.ucsusa.org/food_and_environment/genetic_engineering/pharma-petition-to-usda.html

19 Dunwell J M and Ford CS, 2005. Technologies for Biological Containment of GM and non-GM crops. Defra Contract CPEC 47.

20 Maize/corn, potato, oilseed rape, soybean, wheat, tomatoes and rice

21 These codes are available online: http://www.uktradeinfo.com/index.cfm?task=icnbrowstwo&Sector=1

22 See http://www.isaaa.org/resources/publications/briefs/35/executivesummary/default.html

23 Friend of the Earth International, 2007. Who Benefits from GM Crops? An analysis of the performance of GM crops (1996-2006)

24 See report in Financial Express http://www.financialexpress.com/fe_full_story.php?content_id=143180

25 EC regulations 1829/2003 and 1830/2003.

26 A GfK NOP Omnibus poll for Friends of the Earth and GM Freeze in summer 2006 found that 87 per cent of the public think that foods from animals fed on a GM diet should be labelled

27 http://www.gmfreeze.org/admin/uploads/report_doc.pdf

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