



# gm os

Corn growing in the García Rovira province, Colombia.

Issue 105

## genetically modified crops

a decade of failure [1994 - 2004]



**Friends of  
the Earth**  
International



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Published February, 2004 in Penang, Malaysia. ISBN: 90-0914913-9.

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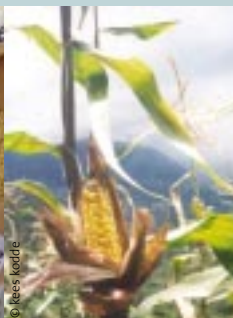
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# genetically modified crops

a decade of failure [1994 - 2004]

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Farmers and members of the public from around the United Kingdom at the October 2003 'Tractors and Trolleys' GM protest.

## executive summary

The first decade of the commercialization of genetically modified (GM) crops was a resounding failure for biotech companies. The first GM crop was commercialized in 1994, and now, ten years later, the promises made by the biotech industry and its powerful lobby groups have still not materialized. Meanwhile, the global opposition to GM crops continues to swell.



### brave new agriculture

The genetic engineering of seeds is without doubt the most radical transformation in food production since the first days of agriculture, more than 10,000 years ago. The first GM crop was commercialized in the United States in 1994. This 'Flavr Savr' tomato was a flop, and was eventually removed from the market. But other GM crops were better received, and between 1996 and 1999 a significant number of GM crops were sown, primarily in the United States, Argentina and Canada.

### the seeding of global opposition

The enthusiasm of the biotech industry about the introduction of GM crops around the world was not universally shared. Concerns quickly arose about the potential health, environmental and socioeconomic impacts of these new crops.

By the end of the 1990s, opposition to GM crops had arisen on every continent. The European Union adopted a moratorium on the commercial growing of genetically modified organisms (GMOs), bans were established in Asian and Latin American countries, and many southern countries refused GM food aid. In general, consumers worldwide were reluctant to embrace GM food.

Although the biotech industry had expected people and governments everywhere to embrace GM crops without question, public scepticism has forced companies to limit their current activities to a few main countries. Biotech corporations failed to market products with clear benefits for consumers or farmers. Instead, GM crops created novel and alarming problems, including genetic contamination.

Biotech giants and their powerful lobby groups relied heavily on public relations strategies to sell their products. For example, they heralded the genetically modified 'Golden Rice' as a solution for Vitamin A deficiency in the Third World, but to date this appears to be a 'golden hoax' to

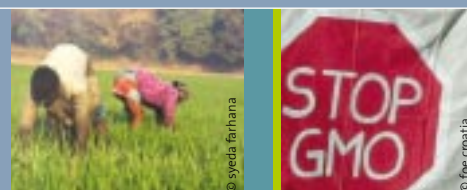
### ten years later: broken promises and unsustainable agriculture

Biotech companies promised that GM crops were safe, that they would provide better quality and cheaper food, that they were environmentally sustainable, that they would improve agricultural production, and that they would feed the developing world.

After ten years, none of these promises have materialized. The regulatory regimes in GM producing countries cannot ensure the safety of GM crops, and the StarLink and biopharmaceuticals incidents are early warnings of the potential health implications of introducing food products not authorized for human consumption into the food chain. Furthermore, not a single GM food on the market is cheaper or better quality than its 'natural' counterpart. GM crops may threaten biodiversity: for example, the 2003 UK Farm Scale Evaluations concluded that GM oilseed rape damaged farmland wildlife.

Developing countries are already experiencing serious problems with GM crops. In several parts of India and Indonesia for example, farmers have complained that Monsanto's GM cotton has not delivered on the company's claims of higher yields and improvements in the livelihoods of farmers. Furthermore, the case of Argentina proves that GM crops are not the solution for feeding the world, as the biotech companies promised. Argentina is the second largest world producer of GM crops, but millions of people in this country go to bed hungry each night.

Large biotech companies like Monsanto are driven to control agriculture markets. In 2003, Monsanto was the world leader in GM crops. Seeds with Monsanto traits accounted for more than 90 percent of the global area planted with herbicide tolerant or insect resistant crops. According to the company's 2003 annual report, their Roundup herbicide is the world's bestselling herbicide. At the same time, the company is suing hundreds of farmers in the US and Canada in an attempt to prevent them from saving their seeds, a tradition and right since the beginning of agriculture.



promote GM crops. Behind the scenes, biotech companies play dirty to secure their interests; for instance the biotech industry has been behind various threats of trade sanctions, including the attempts by the US administration to impose GM food on reluctant countries like Bolivia, Croatia and Sri Lanka as well as on the European Union.

However, citizen opposition to GMOs is snowballing. In Europe, distrust is so high that GMOs have in effect been removed from the majority of supermarket shelves. In the South, several countries in Latin America, Africa, and Asia have rejected GM food aid outright. Consumer and retailer suspicion has forced Monsanto to delay the commercialization of its GM wheat, initially planned for 2004.

The biotech industry's dream of the large-scale introduction of GM crops around the globe would further exacerbate the ecological vulnerability already associated with monoculture agriculture. Ten years later, it can be concluded that GM crops are leading us down a dangerous path to unsustainable agriculture.

Fortunately, however, there are viable and practical alternatives to GM crops that are almost invariably cheaper, more accessible, more productive in marginal environments and more culturally and socially acceptable. The failure of biotech companies in the last decade and the growing global opposition should catalyze a shift of focus towards alternative, reliable agricultural techniques that are less costly than the multi-billion dollar modern biotechnology industry



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## our dream a world without genetically modified crops

foreword by ricardo navarro, chair, friends of the earth international



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2004 marks the tenth anniversary of the commercialization of the first genetically modified (GM) crop in the United States. Ten years of experience has shown that the fears and concerns raised by environmentalists throughout the 1980s and 90s have come true. Contrary to the promises made by biotech companies, the reality of the last ten years of commercialization shows that the safety of GM crops cannot be ensured, that they are neither cheaper nor higher quality, and that they are not a panacea for global hunger. Moreover, the creeping spread of GM crops around the planet is a serious threat to biodiversity, and the global ambitions of companies like Monsanto to control agriculture are a menace to the livelihoods of farmers everywhere.

Friends of the Earth International, in collaboration with other organizations and local communities, has been a leading force against the release of GM crops. Friends of the Earth groups in countries as far flung as Nigeria, the United States, Nicaragua, Sri Lanka and the United Kingdom have been campaigning on this front for many years. For example, Friends of the Earth Europe was a lead advocate of the European moratorium obtained in 1999. In 2000, Friends of the Earth United States discovered a GM maize variety not approved for human consumption in the food supply. This was a huge blow to the biotech industry, costing companies over US\$1 billion, and a major contribution to the improvement of regulatory systems in many countries. Friends of the Earth, together with local NGOs and local communities, continued to discover more illegal GMOs through monitoring US food aid sent to Latin America and food products in European supermarkets.

Ten years of GM crops has been enough to substantiate our claim that genetically modified crops play no role in a sustainable future. Now more than ever, we are convinced of the need to prevent the release of GMOs into the environment, and we hope that the grim reality revealed in this report will strengthen the movement against GM crops. In the meantime, we will continue to campaign for agricultural policies based on the needs of local communities, and promote the available alternatives for achieving food security, food sovereignty and environmental sustainability.

The genetic engineering of seeds is without doubt the most radical transformation in food production since the first days of agriculture, more than 10,000 years ago.

The first genetically modified (GM) crop was commercialized in the United States in 1994. This 'Flavr Savr' tomato, engineered by the Calgene company, eventually failed and was removed from the market. But other GM crops received a warmer welcome, and the first significant planting of GM crops, mainly in the US, took place in 1996. The global area planted with GM crops grew at a rapid rate, particularly between 1996 and 1999, but remained primarily concentrated in just three countries: the US, Argentina and Canada.

## chapter one | brave new agriculture



© Karen Robinson/Greenpeace

*Women carrying baskets of seeds and emptying them out to dry them in the sun, Nayakrishni Center.*





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brave new agriculture one

## genetic engineering

a radical new technology



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Genetic engineering, also known as genetic modification, is a relatively new technology that allows scientists to create plants, animals and micro-organisms by manipulating genes in a way that is not possible via traditional or natural processes. GM technology is not simply an extension of conventional agriculture; it is radically different from traditional plant and animal breeding.

Genetic engineering involves the artificial manipulation of seeds at the cellular level, and allows DNA from one type of organism (such as an animal) to be introduced into another unrelated organism (such as a plant). This means that human genes can be introduced into plants or fish. Scientists have already introduced a gene from an arctic fish into a tomato, for example, enabling the tomato to be grown at lower temperatures.

The biotech industry is very enthusiastic about the potential of genetic engineering in the field of agriculture, claiming that it will mean higher

crop yields and fewer pesticides for farmers, and better quality and cheaper food for consumers.

The biotech industry has heavily lobbied governments in the US and Canada to adopt GM crops without requiring specific regulations to deal with them. For example, the relevant US authorities consider genetically modified crops to be substantially equivalent to their conventional counterparts, and do not require mandatory safety testing or labeling. Consequently, GM food products are exported to other countries in the world without labeling or other identifying information.

*more information:*

"GMO Contamination Around the World,"

Friends of the Earth International: [www.foei.org/publications/pdfs/contamination2eng.pdf](http://www.foei.org/publications/pdfs/contamination2eng.pdf)

GE Food Alert: [www.gefoodalert.org](http://www.gefoodalert.org)

GM Watch: [www.gmwatch.org](http://www.gmwatch.org)

Third World Network: [www.twinside.org.sg/bio.htm](http://www.twinside.org.sg/bio.htm)

Greenpeace: [www.greenpeace.org](http://www.greenpeace.org)





brave new agriculture **two**

## flavr savr tomato goes rotten

In early 1994, the US Food and Drug Administration (FDA) announced that the 'Flavr Savr', a new genetically modified tomato produced by Calgene, was as safe as tomatoes bred by conventional means. Thus the Flavr Savr became the first fresh genetically modified crop sold in the world.

Calgene, a small start-up biotech company based in California, genetically modified tomatoes so that they could be picked when ripe and transported without bruising. They

believed that the Flavr Savr would have a longer shelf life than conventional tomatoes, and would provide processors and consumers with tastier tomatoes.

The FDA approved the product. More generally, it decided to regulate GM foods in the same way as non-GM foods so they do not require pre-market approval, arguing that the two are the same or substantially equivalent. Nevertheless, there was no scientific evidence that the tomatoes were safe for human consumption. In fact, the FDA ignored the advice of its own scientists who were concerned about studies showing that the GM tomatoes could potentially cause stomach lesions. In one study, gross lesions were observed in 4 out of 20 female rats fed one of the two lines of transgenic tomato. In another study, the rats had both gross and microscopic lesions. The FDA, however, downplayed these findings and did not communicate them to the public.

In 1994, Flavr Savr tomatoes were labeled as GM and sold under the MacGregor's brand name. Initially they sold relatively well, and were available in 2500 stores nationwide by 1995. Ultimately, however, a combination of safety concerns by consumers, the cost of the GM tomatoes (about double the price of ordinary tomatoes), the flavor (not better than non-GM) and the tendency of the tomatoes to bruise led to their withdrawal from the market in 1997.

Ultimately, the world's first commercialized GM crop was a flop. This also led to the demise of Calgene, which had accumulated heavy debts in the development of the tomato. In the end, biotech giant Monsanto bought Calgene, but has never tried to introduce a tomato similar to the doomed Flavr Savr.

source:

Soil Association: [www.soilassociation.org](http://www.soilassociation.org)

More than 40 genetically modified crop varieties are currently authorized for commercialization in the US. The four most popular are corn, soybeans, cotton and canola. Two traits (or qualities) – herbicide tolerance (HT) and insect resistance (Bt) – have been engineered into these commodity crops, which have proven very popular with US farmers and have been widely adopted. Biotech giant Monsanto is the lead producer of GM crops, followed by DuPont/Pioneer, Syngenta, and Dow/Mycogen.



#### tolerating herbicides

Almost two-thirds of the GM crops grown on a commercial basis in the United States have been modified to tolerate certain herbicides or weed killers. Crops such as corn, soy and canola have been genetically engineered to withstand otherwise lethal doses of chemical pesticides. Farmers can therefore douse their fields with herbicides without having to worry about killing their crops.

become resistant, farmers will have to use more glyphosate, leading to unsustainable intensive chemical use.

#### resisting pests

Second in acreage to herbicide-resistant crops, insect-resistant 'pesticide plants' are engineered to produce a toxin in their tissues, the edible grain included. 'Pesticide plants' are produced by 'shooting' a 'gene gun' loaded with a toxin-producing gene taken from a soil bacterium – *Bacillus thuringiensis* (Bt) – directly into the tissues of corn, canola, potato and cotton plants to render them poisonous to insects. About 25 percent of the US corn crop is now planted with Bt varieties. Proponents of genetic engineering argue that Bt crops will reduce the need for pesticides and therefore alleviate stress on the environment. Opponents, including some scientists, argue that the Bt toxin may be a human allergen and that more testing is warranted.

brave new agriculture **three**

## gm crops spread like wildfire

Despite the fact that the first GM crop was commercialized in the US in 1994, it was not until 1996 that significant numbers of GM crops were planted. Over the next few years, GM crops multiplied at a rapid rate, and by 2003 there were over 60 million hectares under GM cultivation around the world. Nevertheless, in 2002 only three countries accounted for 95 percent of this total area: the US (66 percent), Argentina (23 percent) and Canada (6 percent).

Soybean growers appear to have been won over by the convenience of using glyphosate instead of older herbicides. Glyphosate, better known by its trade name Roundup, is a herbicide first introduced in 1974 by Monsanto. Roundup was advertised as safe, effective and relatively benign, environmentally speaking. It became a popular tool in no-till farming, a practice in which farmers spray weeds rather than plowing the ground. In 2001, Roundup Ready soybeans accounted for 75 percent of all soybeans planted in the US. That same year, some 33 million pounds of glyphosate were sprayed on soybean crops alone throughout the country, a fivefold increase from 1995 according to the US Department of Agriculture.

Monsanto generates around 50 percent of its annual sales from Roundup herbicide. Critics point out that the use of glyphosate on millions of acres of crops will intensify resistance in weeds unrelated to soybeans. As weeds

Companies claim that insect-resistant cotton in the US has led to substantial reductions in pesticide use for certain insects. Bt corn has also become quite popular, as it seems to boost yields in fields plagued by the damaging European corn borer. However, letting the GM genie out of the bottle has also allowed other less benign impacts of tinkering with food to manifest themselves (see page 12).

US-based Monsanto is the world's largest producer of GM crops. 90 percent of the area under biotech cultivation worldwide has been sowed with the company's GM herbicide-tolerant and pest-resistant varieties.

The enthusiasm of a few biotech corporations in the US, Argentina and Canada to adopt GM crops was not shared by others around the world. Concerns quickly surfaced about the potential health, environmental and socioeconomic impacts of GM crops.

Opposition to GM crops appeared on every continent: the European Union adopted a moratorium on their commercial growing, bans were established in Asian and Latin American countries, and many countries in the South refused GM food aid. In general, consumers worldwide were reluctant to embrace GM food.

Pro-biotech countries fought the opposition by threatening countries that decided to adopt bans, moratoria or comprehensive regulations on GM crops with trade sanctions. Meanwhile, in order to gain public acceptance of their product, biotech corporations developed strong public relations strategies with increasing propaganda about the benefits of GM crops.

## chapter two | the seeding of global opposition



Friends of the Earth activists from 14 European countries call for their food to be protected from genetic contamination in October 2002 in Brussels.



A woman working in a maize test field on a farm that is producing seeds for a local seed bank supplying the Institute for Biodiversity, Conservation and Research (IBCAR).



© mathias zeijler/greenpeace

the seeding of global opposition **one**

## environmental, health and socioeconomic concerns

Since 1996, as more and more genetically modified crops took root, a growing number of stakeholders around the world began to voice their concerns about the possible negative impacts of GMOs and their contribution to an unsustainable model of agriculture. Opposition is particularly heated on three grounds: environmental, health and socioeconomic.



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### environmental pitfalls

Scientific research is raising increasing concerns about the potential environmental risks associated with GM crops, including:

**gene transfer:** Genes from GM crops can be (and have been) transferred to wild relatives of these crops. In its report “Genetically Modified Organisms (GMOs): The significance of gene flow through pollen transfer”, the European Environmental Agency states that oilseed rape is “high risk” and sugar beet “medium to high risk” for pollen mediated gene flow from crop to crop and from crop to wild relative.



**pest resistance:** Insect pests may develop resistance to GM crops engineered to contain Bt toxins, shortening the useful life of such crops and compromising the effectiveness of existing Bt insecticides. This has serious implications for the organic community and other farmers using integrated pest management (IPM) and other sustainable agriculture approaches. The naturally occurring Bt pesticide that these non-GM farmers benefit from becomes useless as insects become resistant.

**adverse impacts for non-target organisms:** Pest-resistant crops may have adverse impacts for beneficial insects and other invertebrate populations. In 1999, scientists at Cornell University revealed that pollen from genetically engineered Bt corn could kill Monarch butterflies. The findings of this lab study have since been confirmed in an ongoing field study at Iowa State University. In addition to the monarch butterflies, there is evidence showing that Bt crops may also affect beneficial predator insects such as lacewings and ladybirds when they eat insects that have been feeding on genetically engineered plants. A 2001 US National Academy of Sciences study affirmed that the

Europe. In Canada, canola resistant to three different herbicides resulted from uncontrollable crossbreeding between plants that were each resistant to one herbicide. These 'superweeds' can be difficult and expensive for farmers to eradicate. They could potentially displace existing species of plants, destroying local ecosystems and threatening biodiversity.

#### health concerns

Some of the main concerns about the consumption of GM crops are:

**new allergies:** GM crops could introduce new allergens into foods that sensitive individuals would not know to avoid. The problem is unique to genetic engineering because it alone can transfer proteins across species boundaries into completely unrelated organisms. Genetic engineering routinely moves proteins into the food supply from organisms (such as viruses) that have never been consumed as foods. Thus importing proteins, particularly from nonfood sources, is a gamble with respect to their allergenicity.

British doctors have urged a halt to genetically modified crop trials. In November 2002, the British Medical Association, which has a membership of over 120,000 and represents more than 80 percent of British doctors, said that there "has not yet been a robust and thorough search into the potentially harmful effects of GM foodstuffs on human health."

#### socioeconomic issues

**corporate control:** The corporations that market GMOs and the associated chemicals seek to control agriculture and food production by buying up seed companies, patenting seeds and locking farmers into exclusive agreements. If this strategy succeeds, it will dramatically reduce agricultural biodiversity and lead to more industrialized and unsustainable farming.

**no benefit to consumers:** The majority of GMOs that have been authorized or are pending approval are either herbicide-tolerant or insect-resistant. They pose real problems for the environment and offer absolutely no benefit to the consumer, as they are neither cheaper nor better quality than conventional foods.

Bt 176 variety of GM corn was likely harmful to Monarch butterflies.

**intensification of chemical dependence:** Herbicide-tolerant crops have contradicted the claim that genetic engineering helps the environment. Instead of moving farmers away from their dependence on chemical pesticides, these crops actually encourage pesticide use – a threat to our food and drinking water and to wildlife. Indeed, a 1999 US report, which reviewed more than 8,200 university-run field tests on herbicide resistant crops, found that farmers planting Roundup Ready soybeans used two to five times more herbicide than did conventional soybean farmers.

**creation of 'superweeds':** It has been shown that herbicide resistance genes can spread to related plants via pollen carried by bees or by the wind. Researchers have found evidence for this in the case of canola and sugar beet in

**antibiotic-resistance:** The presence of antibiotic resistance genes engineered into foods (these genes are used by biotech companies as 'markers' to identify new traits in the engineered product) could reduce the effectiveness of disease-fighting antibiotics when they are taken with meals. This concern grew in 2002 when British scientific researchers demonstrated for the first time that genetically modified DNA material from crops is finding its way into human gut bacteria, raising potentially serious health questions. If genetic material from these marker genes can find its way into the human stomach, then people's resistance to widely used antibiotics could be compromised.

**increased toxins in plants:** The addition of new genetic material through genetic engineering could also increase levels of toxic substances within plants.

*sources: The Union of Concerned Scientists:*  
[www.ucsusa.org/food\\_and\\_environment/biotechnology/index.cfm](http://www.ucsusa.org/food_and_environment/biotechnology/index.cfm)

*British Medical Association:* [www.bma.org.uk](http://www.bma.org.uk)

*more information:*

*FoE US website:*

[www.foe.org/camps/comm/safefood/gefood/index.html](http://www.foe.org/camps/comm/safefood/gefood/index.html)

*European Environmental Agency:*

*"Genetically Modified Organisms (GMOs):*

*The significance of gene flow through pollen transfer", March 2002:*

[http://reports.eea.eu.int/environmental\\_issue\\_report\\_2002\\_28/en](http://reports.eea.eu.int/environmental_issue_report_2002_28/en)

*"GM genes found in human gut",*

*The Guardian, 17 July 2002:*

[www.guardian.co.uk/Archive/Article/0,4273,4463029,00.html](http://www.guardian.co.uk/Archive/Article/0,4273,4463029,00.html)

*"Research on effects of Bt maize on Monarch butterflies," Nature, May 1999:*

[www.nature.com](http://www.nature.com)

*“94.6 percent of EU citizens want the right to choose, 85.9 percent want to know more before eating GMOs, and 70.9 percent simply do not want GM food.”*

Eurobarometer opinion poll, European Commission, December 2001.

the seeding of global opposition two

## europe says ‘no’ to gmos



Since the 1990s, there has been growing public concern in Europe about the impact that GM crops will have on both the environment and public health. Environmental and consumer organizations, doctors, scientists, food processors and retailers, farmers, landowners, development agencies and the majority of European citizens have increasingly raised their concerns.

A survey of leading European food manufacturers carried out in 2000 showed that faced with consumer opposition to GMOs, nearly all of Europe's top twenty food processing companies, including Unilever, Nestlé and Kraft/Jacobs/Suchard, had either already removed or intended to remove genetically modified ingredients from their product lines.

*“Ingredients used in our products are not derived from genetically modified sources and no GMOs are used in our soft drink manufacturing process or in those of our ingredients suppliers in Europe.”*

**Pepsi Cola**

*“Respecting consumer concerns was a priority for Danone. Therefore it has decided not to use such ingredients in its products sold in the EU.”*

**Danone**

*“Kellogg's is conscious of consumer preferences and does not use GM maize or soy ingredients or derivatives in its breakfast cereals sold in Europe.”*

**Kellogg's**



© foe ewm/nick cobbing

more information:

A map of all GM-free communes in Italy can be found at:

[www.rfb.it/comuni.liberi.ogm/comuni\\_aderenti/adesioni.htm](http://www.rfb.it/comuni.liberi.ogm/comuni_aderenti/adesioni.htm)

See UK GM free zones at:

[www.foe.co.uk/campaigns/real\\_food/resource/gm\\_free\\_britain/index.html](http://www.foe.co.uk/campaigns/real_food/resource/gm_free_britain/index.html)

An interactive map on the FoE UK website:

[www.foe.co.uk/campaigns/real\\_food/press\\_for\\_change/email\\_la/index.shtml](http://www.foe.co.uk/campaigns/real_food/press_for_change/email_la/index.shtml)

Information about GM-free zones in Wales:

[www.foe.co.uk/cymru/english/campaigns/real\\_food/gm.html](http://www.foe.co.uk/cymru/english/campaigns/real_food/gm.html)

Friends of the Earth Europe GMO campaign:

[www.foeeurope.org](http://www.foeeurope.org)

## moratorium mania

The growing concern about the release of GM crops into the food chain and into the environment had prompted five European Union member states to impose either specific bans or some form of moratorium on GM plants by the end of the 1990s. Austria and Luxembourg adopted a ban on Novartis GM maize; France imposed a moratorium on all GM plants with indigenous relatives (such as oilseed rape and beet) for two years; Greece banned a variety of GM oilseed rape; and the UK announced a three-year "moratorium" on insect-resistant GM crops.

In practice, no new GMOs have been authorized for planting or use in the EU since 1998. In June 1999, five EU member states – Denmark, France, Greece, Italy and Luxembourg – issued an official declaration which established a *de facto* moratorium:

they committed to effectively blocking new GMO approvals until comprehensive legislation on GMOs has been adopted. This moratorium has prevented new GMOs from entering the European market since that time.

In addition, independent of the EU moratorium, an increasing number of regions and local areas are working towards becoming GM-free zones. By the end of 2003, ten European regions had declared themselves "the network of GMO-free regions".

For example, the region of Upper Austria has passed a law making it a GM-free zone. Five other provincial parliaments (Salzburg, Tirol, Burgenland, Steirmark and Lower Austria) have also moved to declare their provinces GMO-free. In Italy, four regions (Tuscany, Molise, Lazio and Marche) have banned GM crops. Additionally, a large number of cities have declared themselves GM-free, including

Rome, Milan, Turin, Brescia and Genoa. In Spain, the government of the Basque region has issued a five-year blanket moratorium for GMOs. In Switzerland, three cantons have so far effectively banned the commercial release of GMOs: in the canton of Ticino, a law was passed banning the cultivation of GMOs.

In the UK, 22 areas have approved a GM-free resolution. In November 2003, the British National Trust voted overwhelmingly to go GM free and to ban GM crops from being grown on Trust land. The Trust is the largest private owner of agricultural land in England, Wales and Northern Ireland, owning more than 600,000 acres of land of which over 80 percent is farmed or depends upon farming for its management. Additionally, the Welsh Assembly has adopted a GM-free policy and has passed the first laws on separation distances for crops in Europe.

*“The Georgian Ministry of the Environment demonstrates its negative attitude to the imports of transgenic potatoes and their cultivation. We’re not convinced that it’s safe. [...] The question of the imports and tests with such organisms should be considered in every country as a problem of national safety.”*

Mrs. Nino Chkhobadze, Minister of the Environment in Georgia.

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## gm potatoes mashed in georgia and the ukraine



### **monsanto messes with georgian potatoes**

In May 1996, between 133 and 148 tons of Monsanto’s “NewLeaf” Bt potatoes were imported into Georgia. These GM seed potatoes, from the US and Canada, were planted in traditional potato growing regions in Georgia.

Civil society in Georgia, including Friends of the Earth, protested vocally against the import and cultivation of GM potatoes, and organized a seminar about the issue in the national parliament in August 1996. Despite the ban, approximately 300 tons of potatoes from the 1996 harvest were replanted in 1997 across some 144 to 400 hectares. No detailed figures are available, and so far it has been impossible to track down the transgenic potatoes. They may have been consumed by humans, but they also might have been exported to Azerbaijan or Russia and mixed with non-GM potatoes.

© bajah freeman



GM protesters in Georgia.



Moreover, the production of Monsanto's GM potatoes failed in Georgia, leading to commercial losses and debts for the farmers who cultivated them. The 1996 harvest was extremely low: instead of the estimated 18-22 tons per hectare, farmers only harvested some 8 tons per hectare. Some of the official reasons given for the failure were that the Bt potatoes were not adapted to local conditions, that the planting was done too late, and that the potatoes were affected by a fungus.

Unfortunately, neither Monsanto nor the Georgian Minister of Agriculture has assessed the negative ecological or health impacts of this transgenic potato. No adequate plan for resistance management was carried out for Monsanto's Bt potato harvest in Georgia, nor were farmers informed about the fact that they were sowing GM seeds. Additionally, no monitoring of the potential development of beetle resistance to the Bt toxin was undertaken.

#### **hands off ukrainian potatoes!**

The Ukraine's history with GM crops started in 1997, when Monsanto imported 37 tons of the "NewLeaf" Bt potato for test purposes. Another 367 tons of GM potato seeds entered the country the following year.

In the meantime, the public demonstrated their concerns about the dissemination of GM plants and the potential risks of GMOs in general. Government authorities also took interest in the issue. Consequently, in 1999, the Ministry of Agriculture refused to allow more GM potatoes to be grown as food.

Subsequently, biotech corporations began a widespread public and political pressure campaign to obtain official permission to plant GMOs. In 2000, a draft law with a clear orientation towards the wishes of the biotech industry was prepared. The law contained very weak provisions on biosafety (the safety of GMOs), and did not provide adequate measures to address the potential risks GM crops could have for the environment and for human health. The public was excluded from participating in the drafting of the law, and Friends of the Earth, civil society and some parliamentary groups exerted pressure until the law was finally rejected in the Ukrainian Parliament in January 2001.

*more information:*

*Friends of the Earth Georgia:* [www.greens.ge](http://www.greens.ge)

*Friends of the Earth Ukraine:* [www.zsfoe.org](http://www.zsfoe.org)

A crop's center of origin is the place where it originates. These centers are the basis of food security and cultural traditions, and where tens of thousands of varieties of crops such as corn, potato, soy, and rice are preserved, grown and used by local people.

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# bolivian farmers refuse gm potatoes

Potato varieties stored in the Garcia Rovira province, Colombia, where potato is also a staple crop.





source and more information:  
 Fobomade, see:  
[www.fobomade.org.bo/index1.php](http://www.fobomade.org.bo/index1.php)



### the importance of the potato in bolivia

Bolivia is the center of origin of the potato. Farmers in the high Andean region guarantee their food needs through the diversification of agriculture, and the potato is a basic component in ensuring food sovereignty for Bolivian farming families and for the country.

In April 2000, the Bolivian Biosafety Committee approved a request for field trials of a GM potato resistant to nematodes (a worm). The request was presented by the Bolivian Proinpa Foundation, with material originating from Leeds University in England. There is a high risk of genetic contamination of non-GM potato varieties in Bolivia. This would seriously impact biodiversity and cultural diversity, and could also cause genetic erosion, the disappearance of some varieties, and the loss of traditional cultural practices connected to the potato.

### resistance and withdrawal

When the request to conduct GM potato field trials became known, farmers from different areas in the Andes rejected the experiments in a letter addressed to the Bolivian Vice Minister of Natural Resources and Environment. This strong negative reaction had not been foreseen by the project promoters. Andean farmers firmly opposed the plan, and threatened to destroy the field trials. Meanwhile, protest statements against the introduction of the Bolivian potato arrived from different parts of the world.

The Proinpa Foundation came under heavy criticism at several public meetings in La Paz, Cochabamba and Sucre, Bolivia. In June 2000, it withdrew its GM potatoes field trials project due to the “debate that GM potatoes were generating in the country” and with “the aim to create a better moment for doing so”.



*“As the concerned parties were not willing to certify that the said consignment would not contain any traces of StarLink corn or any other GM traces hazardous to human health, the committee, under [the] circumstances, is unable to permit such imports.”*

Indian Genetic Engineering Approval Committee, March 2003.



© Jaime Spen del Arroyo de la Tierra

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## gmOs in food aid cause global outrage

Most in-kind food aid delivered today consists of US agricultural products provided for distribution in developing countries. A controversy exploded in the year 2000, when it became clear that GMOs were being introduced via food aid shipments into regions and countries where GM food was not allowed and/or without prior information. Such GM food aid shipments were criticized by civil society groups, and in some cases met with recipient government opposition.

### india rejects us food aid

The first documented complaint about the shipment of GMOs in food aid was made in June 2000 in India, with the denunciation of food aid donated by USAID and the World Food Program containing GMOs. In December 2002, India rejected a large shipment of food aid from the United States because it contained genetically modified ingredients.

A. M. Gokhale, chairman of the Genetic Engineering Approval Committee that rejected the consignment, said that: “If there is reason to believe that there may be damage to human health, we have the right to reject any import.” Among the concerns raised by the competent authorities was the fact that there was no full guarantee that StarLink (GM corn not authorized for human consumption in the US, see page 34) was not in the food aid.

Several agencies like CARE-India and Catholic Relief Services pressured the Indian government to authorize the food aid in the beginning of 2003, but in March the Genetic Engineering Approval Committee rejected it again, citing the fact that the food aid importers declined to certify the consignments as StarLink-free.

In fact, US food aid to India is paradoxical, since the country had 65 million tons of surplus non-GM wheat and rice in its Food Cooperation stocks in 2003.



© Juan Lopez, foe europe



### **ecuador orders gm food aid destroyed**

*"We will not allow these types of products to be consumed in the country, especially taking into account that both products are destined for children up to six years of age, and pregnant mothers."* **Director General of the Ecuadorian Health Ministry, May 2001.**

In 2000, Ecuador received a large food aid donation that included 30,000 metric tons of bulk soy paste. The World Food Program (WFP) sold these products, and the money obtained was used in food aid programs for low-income sectors, especially Indigenous populations. Civil society groups monitored food donations in 2001, and discovered that the soy was genetically modified despite Bolivian technical stipulations stating that national products should be used. Furthermore, food programs also forbid GM ingredients in food aid.

Following this discovery, the Ecuadorian authorities ordered the destruction of the product containing raw GM material. They decided not to stop the food relief programs,

This happened despite a promise made in 2000 by the Secretary of the US Department of Agriculture, Dan Glickman, that the agency would ensure that this genetically modified maize did not enter food aid. When it was found in the US food supply in 2000, products containing StarLink were taken off the shelves via a huge product recall (see page 34). Nevertheless, despite written requests that USAID take similar measures in Bolivia, US authorities made no attempt to remove StarLink from the food aid.

### **gm soy removed from colombian food aid**

Genetically modified ingredients were found in US food aid to Colombia in May 2001. The levels of GM content found in the samples tested were as high as 90 percent, the highest levels documented to date. After the discovery, the GM soy was withdrawn from national food aid programs aimed at young children.

### **contradictory food aid in guatemala**

Civil society groups in Guatemala denounced the existence of GM ingredients in food aid, specifically corn seed from the World Food Program, in June 2002. The GMOs were not authorized in the EU, and the fact that Guatemala is also a center of origin of corn raised concerns about contamination. The presence of the GM corn was in contradiction to April 2002 statements by the World Food Program in Guatemala to the effect that: "All food given by the WFP is certified by the health authorities of the Minister of Agriculture, Ranching and Food and the Minister of Public Health and Social Assistance in order not to allow the introduction of GM products."

### **unlabeled food aid gets the boot from uganda**

In 2001, Uganda forbade the entrance of a consignment of corn soy blend, part of a US "food for peace" agreement, because it was contrary to the nation's labeling requirements.

but asserted that the GM soy could be replaced by quinoa, beans or non-GMO soy available at the national level.

### **starlink sneaks into bolivian food donation**

In May 2001, civil society groups in Bolivia denounced the presence of GM ingredients in food aid sent by the US Agency for International Development (USAID). This was in violation of the moratorium on the introduction of GM food in place in the country at that time. US Ambassador Manuel Rocha said: "Those who don't want our donation should not travel to our country, because this is the only food we can offer to our visitors." One year later, in May 2002, the groups discovered "StarLink", a genetically modified variety of maize not authorized in the US for human consumption, in US food aid sent to Bolivia.

### **contaminated corn seed in nicaraguan food aid**

In June 2002, civil society groups in Nicaragua, a center of origin of corn, denounced the presence of GM ingredients in food aid samples. In a news release dated May 24, 2002, the World Food Program had declared that it "does not distribute food that is not acceptable for human consumption by the citizens of the producing countries (donor countries) and by the countries that receive the food assistance".

Nonetheless, one of the seed samples donated by Germany via the World Food Program tested positive for genetically modified organisms, and had a GMO content of 3.8 percent. This level is sufficient to ban products from German grocery shelves. The organizations that made the findings raised the concern that GM corn seeds in food aid may allow genetically engineered corn to enter the birthplaces of corn, thus creating a form of biological pollution that cannot be recalled.

The Ugandan National Bureau of Standards noted that the food aid did not indicate the list of ingredients, the name and address of the manufacturers, nor instructions for use.

### **us withdraws bosnian food aid**

In January 2001, Bosnian authorities asked US officials for detailed information on the possible effects (on both humans and animals) of the corn donated by the US. There was no reply, but the US subsequently withdrew a four million dollar donation of 40,000 tonnes of genetically engineered corn for animal feed.

source: FoEI report *Playing with Hunger*:  
[www.foei.org/publications/pdfs/playing\\_with\\_hunger2.pdf](http://www.foei.org/publications/pdfs/playing_with_hunger2.pdf)

more information:  
*genetic resources action international (grain)*:  
[www.grain.org](http://www.grain.org)

*"We have traditional foods in abundance. I do not know why there is this maize mania when some of our provinces do not even grow maize, traditionally. [...] If we can buy cassava then we have won the war on this hunger and farmers will become solvent to produce more food for the next season."*

Mundia Sikatana, Zambia's Minister of Agriculture.

In 2002 a food crisis affected many countries in Southern Africa, namely Angola, Malawi, Zambia, Zimbabwe, Lesotho, Mozambique and Swaziland. Zimbabwe was the first country to reject US food aid, and others followed. After a few months, some countries accepted food aid that had been milled, in order to avoid the accidental planting of GM seeds. Only Zambia decided to reject GM food aid in both the grain and milled forms.

#### restricting the right to choose

African countries that took a precautionary approach and asked for non-GMO food aid were initially left with little choice. The US and even the World Food Program told them that they should accept some GM content. Their right to choose was clearly impaired. An unnamed US official was even quoted as saying that "beggars can't be choosers".

The shipment of whole corn kernels as food aid carries the danger of genetic contamination, as it allows GM grains to be planted in countries with neither biosafety regulations nor the capacity to deal with GM crops. Further concerns include a negative impact on agro-ecosystems, including the development of

account the specific situation of people in developing countries". These organizations believe that populations fed with food aid, especially children, are particularly vulnerable due to malnutrition and lack of food, and that any potential danger presented by GM foods might increase when they are consumed by an immune-depressed population. According to UK Chief Scientific Advisor Professor David King, forcing GM foods into Africa as food aid is "a massive human experiment".

#### "is it better to die than to eat gm food?"

*"It is very interesting to note that for the first time, Zambia was being forced to accept a gift. Doesn't this worry us as recipients that the giver is insisting that we take the GM foods? Are the Americans just concerned about our stomachs or there is something behind the gift?"* **Zambia Daily Mail, November 5, 2002.**

Africans were forced to accept some GM content in their food aid. Nevertheless, the case of Zambia proved that there were alternatives to GM.

"Is it better to die than to eat GM food?" This question, often raised during the Southern African food crisis, presented a scenario in

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## southern africa rejects food aid in hunger crisis



© Richard Lee, World Food Programme

resistance in target insect pests, harmful effects on non-target insects, the development of herbicide tolerance in weeds, and genetic erosion or loss of traditional crop diversity as a result of genetic contamination through cross-fertilization. To avoid these potential risks, most of the countries decided that the GM food aid should at least be milled to prevent the planting of the grain.

However, milling the maize did not take into account any possible potential risk derived from the consumption of GM food. According to Norway's Minister of International Development: "There might also be a probability of higher risk when one is in a food crisis situation, consuming only one GMO product over time." Many Third World based organizations have been very critical of this risk, considering that the "assumptions about alleged GM food safety are based on a limited range of experiments that do not take into

which there was nothing but GM food available. This scenario has since been proven false, since alternatives could have been made available and are now being provided in large quantities. Current research shows that there was ample non-GM maize and non-GM cereals in the world that could have been sent to countries preferring not to accept GM food, African nations as well as India and Mexico. In fact, it has been shown that even the United States had enough non-GM corn to supply the requisite food aid.

Nonetheless, the World Food Program argued at the end of 2002 that the main goal was to meet the countries' short-term food needs. In the case of Zambia, which was the only country accepting no food aid whatsoever, the WFP claimed that it was impossible to mobilize non-GM food fast enough, as organizing food aid operations requires considerable time and resources.

But again, the lack of choice was just an illusion. Zambian NGOs pledged that they could quickly mobilize surpluses of traditional foods available in the country, like cassava, to food deficit areas if financial resources were made available.

The drought season in Zambia particularly affected the southern part of the country, and the local maize supplies were clearly insufficient. However the northern part of the country, particularly the northwestern province, had food security due to the fact that there were an estimated 300,000 metric tons of cassava, one of Zambia's staple foods, stockpiled there.

The Zambian government asked the WFP to use traditional foods to deal with the crisis. Cassava has a long history as a key crop in food security. Yet cassava was not even included in calculations of the country's food deficit, and the WFP didn't consider it as a possible solution to the crisis. The WFP apparently considers cassava to be an inferior food, although it is eaten by more than 200 million people in Africa and constitutes the main staple food for 30 percent of the Zambian population.



© Richard Lee, world food programme

A coalition of groups, comprising churches and non-governmental organizations (NGOs), worked with the Zambian government to form an alliance to raise funds to buy cassava from areas of surplus and distribute it to food-deficit areas. Despite their recognition that it was a good project, the WFP refused to support the initiative. Given that the WFP in Zambia channels the financial resources of donors and coordinates all food relief efforts, their refusal prevented the project from being implemented.

Instead, the WFP brought barley from the United States, which is not a staple food in Zambia and is only used there for producing beer. This clearly contradicts the principle that food aid should be socially and culturally acceptable to recipient countries.

In the end, the Zambian government stayed firm in its decision not to accept GM food aid. It proved able to cope with the food crisis, supported by many countries and organizations, and the country enjoyed a bumper crop in 2003.

#### linking aids funds to gm food aid

*"It was a wrong decision by the government and I hope they will rethink it. We are going to make more food available to AIDS patients and the government must decide. [...] GM (genetically modified) food is absolutely safe, our experts have done tests and found it completely safe."* **Tommy Thompson, US Health Secretary, December 2003, referring to the Zambian government's rejection of GM food aid.**

Another issue of serious concern arose in May 2003 when the US Senate passed a bill linking assistance for AIDS to acceptance of GMOs. The United States Leadership Against HIV/AIDS, Tuberculosis, and Malaria Act of 2003 urges African states to accept GM food aid, implying that this is a condition for the release of assistance funds. In December 2003 this became even clearer when US Health Secretary Tommy Thompson, in a visit to Zambia related to future donations on the topic of HIV/AIDS, criticized the decision of the Zambian government to reject GM food aid.

more information:

FoEI report *Playing with Hunger*:

[www.foei.org/publications/pdfs/playing\\_with\\_hunger2.pdf](http://www.foei.org/publications/pdfs/playing_with_hunger2.pdf)

Protests against GM food and the Bush administration in Croatia.



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## croatia, bolivia and sri lanka receive trade threats



In face of the potential risks associated with GMOs, many countries have decided to adopt strict measures regulating genetically modified food. On every continent, governments have adopted or prepared moratoria, bans or legislation to prevent the unregulated flow of GM crops. The European Union froze new authorizations for GM crops in 1998. Croatia prepared a draft law for a moratorium on GMOs in 2001. In Asia, Sri Lanka prepared a Food Act with the goal of banning GM food. Japan and South Korea adopted new labeling rules for GMOs. In Latin America, Paraguay imposed a moratorium in 1998 and Bolivia banned GMOs in 2001. In Africa, Benin adopted a moratorium in 2002.

Close on the heels of these measures, biotech companies and pro-biotech governments such as the US started putting overwhelming pressure on these countries, threatening them with trade sanctions via the World Trade Organization (WTO).

### sri lanka shrinks from gmo ban

Early in 2001, the Sri Lankan government drafted a Food Act that would ban GMOs. The Act aimed to protect the Sri Lankan people from the potential and incompletely understood impacts of GMOs.

The US immediately mounted opposition to the proposed ban. The Agricultural Counselor from the US Embassy in India threatened to challenge the ban under the WTO, which could have cost Sri Lanka US\$190 million in penalties if they refused to lift the ban.

Sri Lankan NGOs, including Friends of the Earth, mounted a campaign to urge their government to withstand the threat of a trade challenge. More than 200 consumer, farm and environmental groups worldwide added their voices in protest of the Bush administration's challenge to Sri Lanka's food safety laws. Ultimately, due to pressure from the US as





participating in a roundtable on biosafety organized by the Croatian Environmental Ministry denounced the US bullying of their government about its plans for a GMO moratorium.

The memo from the US Embassy also asserted that biotech food products “have been demonstrated to be as safe as conventional food products in the US and elsewhere”. However, in response to this memo, US NGOs asserted in a letter addressed to the Croatian Minister of Environment that the US regulatory framework and monitoring policies are currently not sufficient to conclude that GMOs are safe.

Although a total ban on GMOs was not adopted due to US intimidation, Croatia finally implemented strict legislation on GMOs in 2003. The legislation does not allow GMO releases in protected areas, buffer zones,

In August 2001, the Bolivian government pledged to extend the ban past the end of the year, and to upgrade it to a “Supreme Decree” having the full force of law. This promise was made in a written agreement between the Bolivian government, farm workers and small farmers’ organizations. Unexpectedly, however, the government was forced to revoke the legislation due to pressure from Argentina and its agri-biotech corporations. The ban was revoked without warning in October.

In a leaked memo from the Bolivian government, it is asserted that “the (Argentinean) soy corporate sector is behind it, because they export five thousand millions of dollars of genetically modified soy to Europe and North America”.

well as Australia, the Food Act ban was deferred indefinitely.

#### **us bullies croatia to accept gmos**

In June 2001, four Croatian ministries agreed on the text of a draft law to ban GMOs and derived products until a more specific regulatory framework is in place. The ban was proposed because of the possible negative impacts of the introduction of GMOs on the environment and human health in Croatia.

By September 2001, Croatia was under increasing pressure from the US to drop the draft law. In a memo dated November 28th from the US Embassy in Zagreb to the Croatian Ministry of Environment, the US tried to put trade before environmental protection, stating: “If such a ban is implemented, the US government must consider its rights under the WTO.” In December, environmental groups

or areas for eco-tourism or organic agriculture. There are also provisions for labeling, and no thresholds for GM content. In short, although US pressure managed to prevent the establishment of a ban, Croatia adopted a law that in practice prevents GM crops from entering the country.

#### **revoked bolivian ban traced to biotech lobby**

Bolivia adopted a resolution banning GMOs in January 2001. It outlawed the import of products, sub-products and foodstuffs of agricultural origin derived from GM crops during a one-year period from January to December 2001. The Bolivian government adopted these precautionary measures because of the potential risks of GMOs to human health and the environment.

Farmers’ and environmental organizations in Bolivia vowed to keep demanding that their country regulate GMOs despite pressure from other countries. Since the Environmental and Development Bolivian Forum discovered that food aid to Bolivia contained genetically modified ingredients, concern is even greater. The Association of Agro-ecology Producers of Bolivia has urged the establishment of controls on food and seed imports from countries like Argentina, Canada and the US, together with the imposition of strong sanctions on any corporation or organization marketing GM products in Bolivia.

*more information:*

*Friends of the Earth Europe:*

**[www.foeeurope.org/press/17.12.01.htm](http://www.foeeurope.org/press/17.12.01.htm)**

*Friends of the Earth Croatia:* **[www.zelena-akcija.hr/eng/green\\_action.html](http://www.zelena-akcija.hr/eng/green_action.html)**

*“[African] countries have not adopted biotechnologies not because of EU restrictions, but rather for other reasons, such as lack of suitable technologies, and lack of regulatory laws and capacity. Consequently, no sub-Saharan African nation joined the US challenge to Europe’s ban, and even Egypt withdrew from the complaint.”*

Third World Network: “Genetically modified crops and sustainable poverty alleviation in Sub-Saharan Africa: An assessment of current evidence”, 2003.

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## force-feeding europe

eu and us launch trade war

*Friends of the Earth's Bite Back campaign aims to prevent the US and the World Trade Organization from force feeding GMOs to Europeans.*



At the end of 2003, Friends of the Earth's giant tomato toured Europe to raise awareness about the US attempt to force GM food on Europeans.



Eventually, once the panel has been selected, it will take evidence (in secret) from both sides before coming to a ruling towards the end of 2004. Notably absent in the process will be civil society representatives, who are prevented from officially participating and even from knowing what is being discussed. While informal sources in Brussels expect a WTO ruling against Europe's restrictive stance on GMOs, the EU will have the right to appeal. The WTO Appellate body will then reconsider the case and come to a final and legally binding ruling 3-6 months after the first ruling. If Europe loses, it will have to comply with the ruling: either adapt its legislation or face heavy trade sanctions.

This battle is not only about Europe: the Bush administration claims that the European moratorium is not only harming US farmers but also stopping developing countries from adopting the controversial technology. However Egypt, the only African country originally



The first shots in the transatlantic trade war over Europe's position on GMOs were fired in May 2003, when the US, Canada, Argentina and Egypt registered a formal complaint with the World Trade Organization (WTO). They complained that Europe's moratorium on new products and the various national bans were a barrier to trade costing the US an estimated \$300 million in lost exports. The complainants were backed up by a number of third parties including Australia, Chile and Mexico.

To date, the dispute has hardly gotten off the ground. In August, the US, Argentina and Canada requested that the WTO form a Dispute Panel, the usual next stage in any trade conflict. However, attempts to decide who should sit on the Panel have slowed the process, with each side repeatedly rejecting the other's suggestions. By the end of 2003 there was still no agreement about the identity of the panelists.

supporting the US position, withdrew even before the consultation process began. In a letter to the European Consumers' Organization, the Egyptian government announced its decision not to proceed "in conscious emulation of the need to preserve adequate and effective consumer and environmental protection". The move angered US trade negotiators, who reportedly tore up a draft free trade agreement with the North African country.

The European Commission has issued statements "regretting" the US move. They also take issue with President Bush's accusations that European policy is hindering hunger relief in Africa, calling the allegations "not founded". In one of their statements, the Commission points to opinion polls in the US that show "a whopping 92 percent of Americans support labeling".

*Friends of the Earth Europe's Bite Back Campaign:*  
[www.foeeurope.org/biteback/index.htm](http://www.foeeurope.org/biteback/index.htm)

*“We strongly object that the image of the poor and hungry from our countries is being used by giant multinational corporations to push a technology that is neither safe, environmentally friendly nor economically beneficial to us. We do not believe that such companies or gene technologies will help our farmers to produce the food that is needed in the 21st century. On the contrary, we think it will destroy the diversity, the local knowledge and the sustainable agricultural systems that our farmers have developed for millennia, and that it will thus undermine our capacity to feed ourselves.”*

Statement signed by 24 delegates from 18 African countries to the United Nations Food and Agricultural Organization.

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## the tarnished record of golden rice



*“If anyone tells you that GM is going to feed the world, tell them that it is not. To feed the world takes political and financial will – it’s not about production and distribution.”*

**Steve Smith, head of Novartis Seeds.**

*“The public relations uses of Golden Rice have gone too far. The industry’s advertisements and the media in general seem to forget that it is a research product that needs considerable further development before it will be available to farmers and consumers.”*

**Gordon Conway, President of the Rockefeller Foundation, the chief funder of the Golden Rice project.**

In light of the deluge of controversy, consumer rejection and increasing opposition to GM crops, biotech companies needed to gain public support. “Golden rice” seemed to be the perfect tool to convince global leaders and the public that GM crops were indispensable for feeding the world and overcoming

*Rice farmers in Bangladesh.*



Rice farmers in Bangladesh.

### gm food unfit to feed the world

*"Seeking a technological food fix for world hunger may be [...] the most commercially malevolent wild goose chase of the new century."*

**Dr Richard Horton, Editor of the scientific magazine The Lancet, <http://news.bbc.co.uk/1/hi/sci/tech/3122923.stm>.**

*"Biotechnology and GM crops are taking us down a dangerous road, creating the classic conditions for hunger, poverty and even famine. Ownership and control concentrated in too few hands and a food supply based on too few varieties of crops planted widely are the worst option for food security."*

**Statement by the international relief organization Christian Aid.**

*"There are still hungry people in Ethiopia, but they are hungry because they have no money, no longer because there is no food to buy. [...] We strongly resent the abuse of our poverty to sway the interests of the European public."*

**Ethiopian Tewolde Berhan Gebre Egziabher, who runs the Ethiopian environmental protection authority.**

*"It is only too obvious to concerned scientists, farmers and citizens alike that we are about to repeat, step by step, the mistakes of the insecticide era, even before it is behind us. I would even argue that these new miracle technologies are mostly not necessary, let alone desirable, to solve the world's food security problem."*

**Hans R. Herren, Director General, The International Center of Insect Physiology and Ecology, Kenya; winner of the 1995 World Food Prize.**



malnutrition in developing countries.

In 1999, Swiss and German scientists announced the development of a "golden rice" genetically engineered to produce beta-carotene, a substance which the body can convert to Vitamin A. The new rice was quickly heralded as a miracle cure for Vitamin A deficiency (VAD), a severe condition afflicting millions of people in developing countries, especially children and pregnant women. At first glance, golden rice appeared to be a godsend. But a closer look reveals a tarnished truth.

### eating mountains of rice

Golden rice will likely do little to ameliorate VAD because it produces so little beta-carotene – just 1.6 micrograms per gram of rice ( $\mu\text{g/g}$ ) at present, with a goal of 2.0  $\mu\text{g/g}$ . Even if scientists reach this goal, a woman

would need to eat 16 pounds (7.25 kilograms) of cooked rice every day in order to obtain sufficient Vitamin A, if golden rice were her only source of the nutrient. A child would need 12 pounds (5.44 kilograms). From a more practical perspective, three half-pound (.22 kilogram) servings of cooked golden rice per day would provide only 10 percent of her daily Vitamin A requirement, and less than 6 percent if she were breastfeeding. Yet even these modest contributions are uncertain. In order to absorb beta-carotene, the human body requires adequate amounts of zinc, protein and fats, elements often lacking in the diets of poor people. Those with diarrhea – common in developing countries – are also unable to obtain Vitamin A from golden rice.

*"A single nutrient approach towards a nutrition-related public health problem is usually [...] neither feasible nor desirable."*

**John R. Lupien, Director, Food and Nutrition Division,**

### Food and Agricultural Organization, United Nations.

Nutrition experts thus confirm what common sense tells us – a balanced, diverse diet supplying a full range of foods and nutrients is the only sound way to promote health and prevent VAD and other nutritional deficiencies. A preschool child's daily requirement of Vitamin A can be met with just two tablespoons of yellow sweet potatoes, half a cup of dark green leafy vegetables, or two-thirds of a medium-sized mango. And unlike golden rice, these vegetables supply other micronutrients as well and are available in many developing countries where people are affected by VAD.

source: [www.foe.org/camps/comm/safefood/gefood/factsheets/ricefacts.html](http://www.foe.org/camps/comm/safefood/gefood/factsheets/ricefacts.html)

more information:

genetic resources action international (grain):

[www.grain.org](http://www.grain.org)

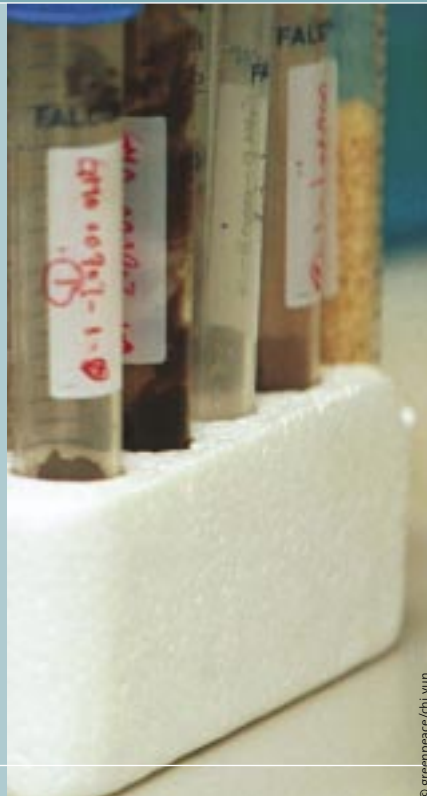
Greenpeace: [www.greenpeace.org](http://www.greenpeace.org)

*“I think consumers will boycott the whole wheat industry. [...] Millers have no choice, consumers do. If the consumers don't accept GM wheat, then the millers won't. The consumer is king.”*

Dong Jin Chung, senior vice chairman of KOFMIA and president of the Daehan Flour Mills (CropChoice News, May 2, 2003).

the seeding of global opposition ten

## monsanto's wheat dreams deferred



In December 2002, Monsanto applied for commercial authorization to cultivate GM wheat in Canada and the US, anticipating its introduction in both countries in 2004-2005. The new variety that Monsanto has in the pipeline is a Roundup Ready herbicide-tolerant wheat.

The introduction of wheat in the US and Canada is very controversial, and many farmers in these countries reacted skeptically to Monsanto's GM wheat plans, particularly given the possible negative economic consequences.

© greenpeace/chi yun



### *“We don't want GMO wheat.”*

Hi Sang Lee, chairman of the Korea Flour Mills Industrial Association (KOFMIA). KOFMIA represents nearly 100 percent of Korea's flour millers. (CropChoice News, May 2, 2003).

The National Farmers Union of Canada and the Canadian Wheat Board expressed in the strongest terms their concerns that GM wheat will damage exports. In the US, farm representatives in North Dakota and Montana have sought legislation restricting GM wheat production, saying that their customers will not accept GM wheat. In a letter to the Canadian Prime Minister, over 300 industry associations, local governments, citizen groups, experts and researchers said: “We represent diverse constituencies and interests, but we are unified in asking that you act immediately to prevent the introduction of GM wheat into Canadian food and fields unless the concerns of Canadian farmers, industry, and consumers are addressed adequately.”

Importers from the rest of the world are reacting to Monsanto's plans to market GM wheat. For example, a US Wheat Associates

survey on the Asian markets found overwhelming opposition: “100 percent of the markets surveyed in China, Korea, and Japan indicated that they would not buy Roundup Ready wheat. 82 percent surveyed in Taiwan, and 78 percent in South Asia said they would not buy genetically modified wheat.”

In Europe, the major wheat importers had similar reactions. Antonio Costato, CEO of Italy's biggest miller Grandi Molini Italiani, confirmed the company's opposition to GM wheat: “We will not only avoid buying GM wheat, but we will probably be forced to completely avoid importing from those countries/regions where it is known that GM wheat is grown.”

Opposition continues to blossom on every continent. Millers in Latin America, like the country's largest wheat importer Molinos de Costa Rica, wrote a letter to US Agriculture Secretary Ann Veneman informing the

Department of Agriculture that they will not buy wheat from the US if it commercializes genetically modified varieties. In Africa, Ethiopian millers have announced similar measures.

The rejection of GM wheat is gaining momentum within the US and Canada as well as at the international level, putting a brake on Monsanto's ambitious plans. The biotech giant has already announced that it will not seek registration for the grain for production in 2004, as was initially planned.

*more information:*

*GE Food Alert Website:*

**[www.gefoodalert.org/pages/home.cfm](http://www.gefoodalert.org/pages/home.cfm)**



the seeding of global opposition **eleven**

## people vs. monsanto in colombian cotton fight

In 2002, the Colombian government authorized Monsanto's GM Bt cotton for "pre-commercial" purposes. The authorization, granted by the relevant agricultural authorities, was the result of a process full of irregularities. There were no adequate environmental impact assessments, and the approval was granted after only two field trials in a single location.

Moreover, the role of Monsanto in the authorization reflects a biased decision-making process. Monsanto authored the studies and the final report about the performance of the Bt cotton, and organized the field trials. In addition, a Monsanto employee was the vice president of the institution that advised the government on the final authorization of GM crops.

Colombian civil society was uneasy about the impacts of Bt cotton in Colombia, particularly fearing the effects on native varieties as the country is a center of diversity for cotton. Therefore, Colombian NGOs initiated a popular legal action against the government's decision in February 2003.

In October 2003, a Colombian administrative tribunal suspended Monsanto's authorization to import, grow and test genetically modified cotton. The tribunal ruled that the import and testing of this GM cotton violated the collective rights to a healthy environment and public health, as well as the consumer's right to choose and the right to public participation in decisions that can affect the environment.

The tribunal agreed with the plaintiffs that the lack of an environmental license granted by the Environment Ministry and the absence of the required Environmental Impact Assessment (EIA, which Monsanto should have prepared) contravene Colombian environmental laws.

The tribunal ordered the Environment Ministry to produce an EIA in accordance with the law, and charged Monsanto with carrying out such an assessment. Finally, the tribunal ordered the Public Defender's Office to investigate the process due to potential corruption.

This decision constitutes an important victory for environmentalists in Colombia, as it is the country's first court decision on the introduction of GMOs. It also reinforces the right to public participation in administrative decisions that can affect the environment, human health and the livelihoods of Colombian people.

source: *Semillas Colombia*:  
[www.biodiversidadla.org/article/view/3866](http://www.biodiversidadla.org/article/view/3866)  
[in Spanish]

more information:  
*Friends of the Earth Colombia*:  
[www.censat.org](http://www.censat.org) [in Spanish]



After ten years of commercialization of GM crops, there is increasing evidence that genetically modified crops are leading agriculture down an unsustainable path.

The challenges faced by the main producing countries - the US, Canada and Argentina - in planting genetically modified crops are key to assessing the potential environmental, health and socioeconomic impacts of GMOs. Other countries have begun planting for experimental, commercial or pre-commercial purposes, and their experiences will also help to illuminate the reality of GM crops. For example, India and Indonesia have started planting Bt cotton, and Spain has gained considerable experience with Bt maize. The UK initiated a farm-scale evaluation of GM crops in 1999. Disturbingly, GM corn has been found in the field in Mexico, a center of origin of corn.

## chapter three | ten years later

broken promises and unsustainable agriculture



*Corn growing in the Garcia Rovira province, Colombia.*

*“What Monsanto wished for from Washington, Monsanto and, by extension, the biotechnology industry got. If the company's strategy demanded regulations, rules favored by the industry were adopted. And when the company abruptly decided that it needed to throw off the regulations and speed its foods to market, the White House quickly ushered through an unusually generous policy of self-policing.”*

*‘Biotechnology Food: From the Lab to a Debacle’,  
The New York Times, January 25, 2001.*

Throughout these ten years of commercialization, the US biotech industry has tirelessly asserted that GM crops are safe, that they present no risk to the environment or human health, and that they provide many benefits for farmers and consumers, such as higher yields and better food quality.

Genetically modified foods have been on US supermarket shelves for a decade. Over 50 percent of processed foods in the US contain some GM ingredient, and over 70 million US acres have been planted with GM crops. Yet the debate over GM crops in the US has been relatively tame in comparison with the outcry on the international level, where the introduction of GM foods has led to enormous turmoil, wide opposition and outright rejection.

#### **united states: land of gmo freedom**

In the United States, GM foods are considered to be substantially equivalent to their conventional counterparts. The regulatory system was founded on the notion that GM foods are unchanged, hence safe, and thus require no mandatory safety testing and no specific regulation. It is not surprising that the US government has allocated scarce funding for research into the potential

enable the FDA to ensure that GM crops are safe to eat: toxins and anti-nutrients that may affect food safety and nutrition are not always evaluated; the methods to determine allergenicity are inadequate; data summaries often lack sufficient detail or information to determine safety; and so on and so forth.

The fact that the US government continues to refuse mandatory safety testing and labeling of GM crops and food has infuriated a growing number of US citizens. Several legal actions have been filed, and hundred of thousands of people have called for labeling and testing. Moreover, several incidents, including the StarLink scandal and the contamination of biopharmaceutical crops, have underlined the weaknesses and flaws in the US system.

#### **the starlink scandal**

*“I think we’re just hitting the tip of the iceberg here. We just don’t know what’s in those elevators, and when we start letting this stuff go and it’s tested, it’s going to get worse.”*  
**Iowa grain elevator operator, The Washington Post, October 25, 2000.**

StarLink is a variety of GM maize authorized in the United States only for animal feed purposes.

ten years later: broken promises and unsustainable agriculture one

## uncontrolled contamination in the united states

health and environmental impacts of genetically engineered foods. The US Department of Agriculture, for instance, spends just US\$3.6 million out of a \$193 million research budget on studies that examine the possible environmental impacts of GMOs.

One of the main reasons for the lax regulatory system in the US is the enormous influence of the biotechnology industry, and particularly the Monsanto corporation, upon the government.

#### **questioning the safety of gm crops**

In recent years, the debate about GM crops in the US has heated up, and the ineffective regulatory system has been subject to increasing criticism. For example, the policy of the US Food and Drug Administration (FDA) for evaluating the safety of GM crops has been deemed inadequate. A 2003 report by the Center for Science in the Public Interest concluded that the regulatory process does not

It was not allowed for food consumption because of the potential allergenicity of the protein Cry9C that was genetically engineered into the maize. Nevertheless, in 2000, Friends of the Earth campaigners discovered StarLink in ‘Taco Bell’ taco shells, a maize-derived food product. By extension, this meant that StarLink was present in the human food chain.

The magnitude and gravity of the StarLink contamination was breathtaking. More than 300 corn products were recalled across the United States. Despite the fact that StarLink was only planted on 0.4 percent of total US corn acres, the numbers of acres contaminated was much greater. More surprising, although the contamination was only supposed to be found in StarLink brand seeds, it was later reported that the Cry9C protein was found in another 80 varieties of yellow corn seed. Even more unexpectedly, it was found in a white corn product, when it was previously believed that contamination could only happen between varieties of yellow corn.



Larry Bohlen of FoE US tested supermarket products for illegal Starlink corn.

StarLink contamination was not contained to the US, but was also detected in 2000 and 2001 in food shipments to Japan and South Korea. This led to a series of recalls in these countries as well. At the June 2002 United Nations World Food Summit in Rome, Latin American NGOs announced that StarLink had been found in US food aid in Bolivia (see page 21). And at the end of December 2002, StarLink was discovered again in Japan.

The StarLink case provides clear evidence that GMO contamination is one of the most urgent problems posed by GMO releases into the environment. Once an organism is released, the consequences are unpredictable and the impacts unknown. The fact that a released organism is very difficult to recall has been ignored and downplayed by US authorities, but the problems of real life contamination illustrate the fact that US regulatory systems for GMOs are clearly inadequate.

*"You'd think that the North American agricultural export industry would have no choice but to bow to the demand: keep GM seeds far away from their unaltered counterparts and in general move away from the controversial crops. You'd be wrong. The real strategy is to introduce so much genetic*

that they do not produce naturally. A few known examples include a contraceptive, potent growth hormones, a blood clotter, blood thinners, industrial enzymes, and vaccines.

In November 2002, the first significant case of contamination by biopharmaceuticals was reported. The company involved, ProdiGene, conducted a range of open-air testing of crops containing pharmaceuticals and industrial products. In this incident, Prodigene failed to properly remove all remnants of GM maize from a field cultivated in 2002. Consequently, some seed remained in the ground, and these 'volunteer' seeds germinated in 2003, thereby contaminating a crop of soy. Subsequently, when the soy had been harvested and was at a grain elevator in Nebraska, it was discovered that it had been contaminated by the ProdiGene maize. 500,000 tons of soy worth some \$2.7 million were quarantined by the US Department of Agriculture and later ordered destroyed.

This example should prove that open-air cultivation of biopharmaceutical crops threatens global food supplies, jeopardizes non-biopharmaceutical crops with contamination, and may pose potential problems for wildlife and ecosystems. In the US, some 300 open-air cultivations took place between 1991 and 2002.

73.1 million pounds (33 kilos) in two sets of applications between 1996-8 and 2001-3.

There are many factors that can produce an increase in the average amount of pesticides applied per acre, but reliance on a single herbicide (the primary method for managing weeds on fields with GM herbicide-tolerant varieties) has been identified as the main cause.

*"Reliance on a single herbicide as the primary, if not sole method for managing weeds on fields planted with HT varieties, and the resulting indeed inevitable ecological responses to such intense herbicide selection pressure remains the primary factor that has led to the need to apply more herbicides per acre to achieve the same level of weed control."*

**Charles Benbrook, "Impacts of genetically engineered crops on pesticide use in the United States: The first eight years", November 2003.**

more information:

FoE United States website:

[www.foe.org/camps/comm/safefood/gefood/index.html](http://www.foe.org/camps/comm/safefood/gefood/index.html)

GE Food Alert website:

[www.gefoodalert.org/pages/home.cfm](http://www.gefoodalert.org/pages/home.cfm)

*pollution that meeting the consumer demand for GM-free food is seen as not possible. The idea, quiet simply, is to pollute faster than countries can legislate –then change the laws to fit the contamination."*

**The Guardian, January 21, 2001.**

#### **biopharmaceuticals contamination**

*"Plans to add drug genes to food crops prove we've learned nothing [...] Why on earth are companies adding these genes to plants which through pollination or mix-ups with seeds could allow the genes and their products to find their way into food?"*

**The New Scientist, July 2002.**

The US experience with GMOs provides another example of major concern for the environment: 'biopharmaceuticals'. 'Biopharming' is an experimental application of biotechnology in which plants are genetically engineered to produce pharmaceutical proteins and chemicals

In October 2003, Monsanto announced that it was abandoning biopharming technology and closing its 70-person division. This followed extensive lobbying of the US government by consumer and environmental groups for tougher regulations, as well as outspoken opposition by the food processing industry, which is concerned about the health risks faced by customers through product contamination.

#### **pesticide use in gm crops on the rise**

One of the key arguments of the biotech industry has always been that GM crops have environmental benefits, in particular that the herbicide-tolerant (HT) varieties need fewer pesticides.

However, recent studies on the use of pesticides in GM varieties showed a progressive increase in their application between 1996 and 2003. The volume of pesticides applied to herbicide-tolerant GM corn, soybean and cotton increased

#### **biosafety protocol contradicts us gmo policy**

The Biosafety Protocol is a United Nations agreement adopted in 2000 in Montreal, Canada that seeks to protect the environment from the potential risks of GMOs. It became law on September 11th 2003, and by early 2004 over 80 countries around the world had become party to this treaty.

One of the Biosafety Protocol's main objectives is the regulation of the transboundary movements of GMOs. The Protocol is the first international agreement that clearly shows that GMOs are different from conventional organisms and therefore require different treatment. The Protocol thus contradicts policies held by some countries, such as the US, which maintain that GMOs are not different from the conventional plants and animals from which they are derived.

more information:

[www.biodiv.org/biosafety/default.aspx](http://www.biodiv.org/biosafety/default.aspx)

*“In Argentina, the ‘success’ of the GM soybean story must largely be attributed to marketing by the seed companies involved, rather than scientific evidence and farmer experience.”*

Walter Pengue, agricultural engineer specialized in genetic improvement at the University of Buenos Aires, Argentina.

ten years later: broken promises and unsustainable agriculture **two**

## argentina shows gm does not ‘feed the world’



Argentina is the world’s second largest producer of genetically engineered crops, in particular soy. Eight years after the introduction of GM soy, the biotech industry’s claims that its crops are environmentally and socially benign have yet to bear fruit. Increasing evidence shows that GM soy is exacerbating the existing agricultural model, which is increasing poverty, damaging the environment and threatening food security for the vast majority of Argentineans.

During the last quarter of a century, soybean production increased at a swift rate from an area of 38,000 hectares in 1970 to approximately 13 million hectares in 2003. Around 70 percent of the soy harvested is converted into oil, and most of it is exported. Argentina is the source of 81 percent of the world’s exported soy oil, and 36 percent of the soybean meal.

GM soy was introduced in Argentina in the last half of the 1990s. Argentinean farmers started using the GM ‘Roundup Ready Soy’ sold by Monsanto in 1996, and after a few years practically all of the soy produced in the country was genetically modified.

### **smaller yields and more herbicides**

Two of the biotech industry’s main arguments are that GM crops increase yields and that they require fewer herbicides.

The experience in Argentina shows exactly the opposite. Roundup Ready soy does not have higher yields. The increase in Argentinean soy production is the result of an increase in acreage, for example by the replacement of other crops with soy or by using more forestland, contributing to deforestation.





© greenpeace/buyse

Roundup Ready soy has proven to require more, not less, herbicide than conventional soy. In 2001, more than 9.1 million more kilograms of herbicide were used for GM soy in comparison with non-GM. The use of glyphosate herbicide (sold by Monsanto) doubled from 28 million liters in the period 1997-98 to 56 million liters in 1998-1999, and reached 100 million in the 2002 season.

Moreover, weeds resistant to Roundup Ready soy have already been identified in Argentina, and this is contributing further to the increased use of herbicides. This weed resistance has prompted the use of highly toxic herbicides with Roundup Ready soy, and farmers have started using herbicides, including some that are banned in other countries (including 2,4-D, 2,4-DB, Atrazine, Paraquat and Metsulphuron Methyl).

#### more poverty

A myth constantly promoted by proponents of GM crops is that they are key to solving global hunger and poverty. The example of Argentina, the world's second largest producer of GM crops, demonstrates the opposite.

Millions of Argentineans go to bed hungry each night. There are many causes for the current situation in Argentina, but it is clear that the promotion of GM soy is further boosting the current model of export-oriented agriculture. This model is enriching a few and relegating the majority of Argentineans to poverty. Within the past decade, 160,000 small farming families have been forced from the land, unable to compete with large farms. GM soy has exacerbated this trend towards large-scale, industrialized agriculture, and is thus aggravating poverty.

#### potential health risks

Faced with an increase in poverty, large amounts of soy and a lack of other agricultural products, the Argentinean government began to promote soy as a healthy alternative to traditional foodstuffs such as meat and milk. A campaign called 'Soja Solidaridad' (Soy Solidarity) was launched. Soup kitchens started serving soy-based meals, and cookbooks were written with soy-based recipes. As a result, many people are consuming soy-based foods on a daily basis.

This entails potential risks for the health of these populations. Although soy can form part of a healthy diet, there is a large body of scientific evidence showing that an over-reliance upon soy can have nutritionally damaging effects. Too much soy can inhibit the absorption of calcium, iron, zinc and Vitamin B12, and may produce problems like early onset of puberty in girls.

*source: Grupo de Reflexion Rural Argentina.*

*“I’ve been using my own seed for years, and now farmers like me are being told we can’t do that anymore if our neighbors are growing (genetically modified) crops that blow in. [...] Basically, the right to use our own seed has been taken away.”*

Percy Schmeiser, Canadian farmer.

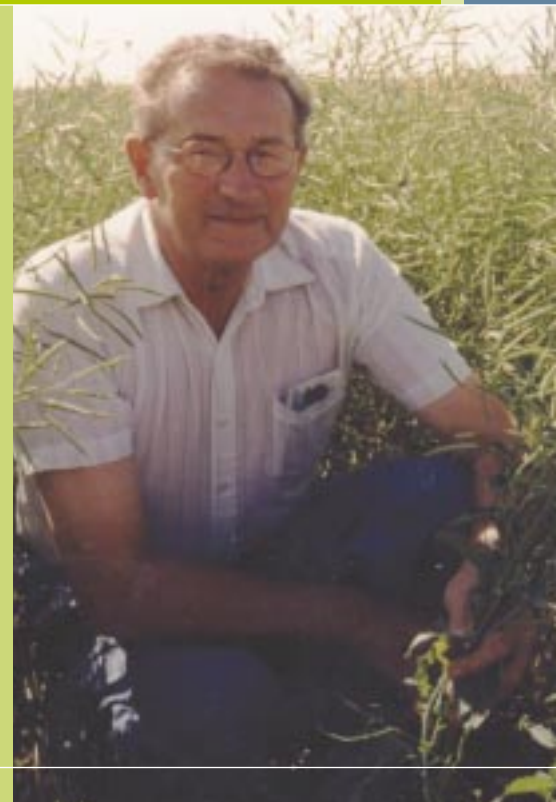
*Percy Schmeiser in his fields in Saskatchewan, Canada.*

ten years later: broken promises and unsustainable agriculture **three**

## corporate control of seeds in canada

The customary right of farmers to save, use and exchange their seeds and other planting material is one of the cornerstones of agricultural practices. Traditionally, farmers have saved their best seeds and used them the following year. Now seed companies sell genetically modified seeds to many farmers, but with the agreement that they will only be used for one season. This means that farmers are forced to buy the company's seed each year.

US biotech giant Monsanto is suing US and Canadian farmers for saving their seeds and breaching patent rights. But even farmers who never bought GM seed are at risk of losing their rights to their own seeds due to genetic contamination. Monsanto is suing farmers whose fields have been contaminated by their patented GM varieties, despite the fact that those farmers never voluntarily grew GM crops. The case of Canadian farmer Percy Schmeiser is the perfect illustration of the new threats that GM crops pose to the livelihoods of farmers all over the world.



My neighbors and 40 percent of farmers in Western Canada plant GM rapeseed. Since 1993, Monsanto Canada has been licensed to use technology that will make plants resistant to its glyphosate herbicide, Roundup. Farmers can then use Roundup as a broad-spectrum herbicide without damaging their GM crop. In 1995, Canada approved the uncontained release of GM rapeseed, and in 1996 local companies started selling GM varieties.

Although Monsanto owns the gene and the technical know-how, they did little to contain their invention once it entered the environment. In 1998, Monsanto inspectors entered my land without permission and took rapeseed. They accused me of planting GM rapeseed without a license and prosecuted me. If Monsanto suspect farmers are growing GM rapeseed without a license, they take away rapeseed plants for inspection. If test results are positive and the license fee of Canadian \$15 per acre and contract have not been met, legal proceeding for infringing Monsanto's patent follow.

In my case, GM plants had seeded themselves on my land and they pollinated my conventional rapeseed. The following planting season I tried to contain GM contamination by buying new seed, but 20 percent of my harvest was still contaminated.

violation when I spray my crop with Roundup and activate the innovation - the gene that confers glyphosate resistance.

When this gene incorporates itself into a seed or plant, what are Monsanto's rights? The seed and plants are the farmer's property. GM rapeseed has the ability to intrude where it was not planted. It has the unique ability to replicate itself. I believe Monsanto lost its right to exclusivity when it lost control of its invention. How can farmers avoid GM rapeseed getting into their crops and becoming a contaminating weed?"

#### organic farmers sue big corporations

*"Since wheat is the cornerstone of prairie agriculture, and essential for organic crop rotations, losing wheat to genetic contamination would devastate organic farming in Saskatchewan. [...] We feel we have no choice left but to pursue legal action. This is a matter of survival for organic agriculture in Saskatchewan."*

**Arnold Taylor, President of the Saskatchewan Organic Directorate.**

Organic farmers' communities in Canada are fighting against the genetic contamination of their organic crops. In January 2002, two



Percy on tour with Polish farmers.

© Iza Kruczkowska

#### testimony by percy schmeiser about his fight against monsanto

"My name is Percy Schmeiser. I am a Canadian farmer. For the last 50 years, my wife Louisa and I have farmed 1441 acres in Bruno, Saskatchewan. We have built up a farm that works well. Rapeseed is an important crop for us, and we used to sell it all over the world for cooking oil and cattle feed. Like most farmers in Western Canada, I collected and stored my own seed. After years of selection, I had a variety that gave a good yield, was quite resistant to local diseases and was relatively weed free.

In 1997, I sprayed Roundup as usual on the weeds and stray rapeseed plants growing around my fields. I was surprised that so much rapeseed survived the application. Had I got the herbicide concentration wrong? I now realize this was the first sign that my fields had been contaminated by genetically modified (GM) rapeseed.

In Canada there is no law against carrying rapeseed in open trucks or leaving cut rapeseed in the field. This makes it easy for the small seeds to spread. It is also impossible to contain pollen flows. The gene responsible for glyphosate resistance is a dominant gene and rapeseed is an open-pollinated plant. When a GM plant crosses with conventional rapeseed, resistance will be carried into the following generation. In my fields the GM variety was thickest along the roadway. There was little in the field itself. When I received the court summons I wondered why anyone would think I had deliberately mixed GM rapeseed with my own seed. The only advantage of growing GM rapeseed is its resistance to Roundup.

If farmers spray Roundup on a mixed GM and non-GM crop they can expect big losses. In my defense I argue that possessing the seed does not violate Monsanto's patent. It becomes a

organic farmers from Saskatchewan filed a class action lawsuit against biotech giants Monsanto and Aventis on behalf of all certified organic farmers in Saskatchewan. The aim of the suit was to obtain compensation for damages caused by the introduction of Aventis' and Monsanto's GM canola, and an injunction that prevents the introduction of Monsanto GM wheat in Saskatchewan. The suit also aims to make the companies liable for genetic contamination as well as trespass, negligence, and environmental pollution.

*more information:*

*Percy Schmeiser's website:*

**[www.percyschmeiser.com](http://www.percyschmeiser.com)**

*Saskatchewan Organic Directorate:*

**[www.saskorganic.com](http://www.saskorganic.com)**

Farmers in South Sulawesi burning GM cotton in September 2001.



In 2001 a coalition of Indonesian NGOs campaigning on biosafety and food took legal action against the decree authorizing the sale of GM cottonseeds for cultivation in South Sulawesi, citing the inadequate environmental impact assessment and lack of public participation. Unfortunately, the NGO coalition lost the case in court in September 2001.

#### conventional cotton preferred

Monsanto promoted Bt cotton among farmers by arguing that it was environmentally friendly, that it used fewer pesticides, that it would ensure an abundant harvest, that it was good for export and that it would increase the welfare of farmers.

In general, however, Bt cotton was a failure. It succumbed to drought and pest infestations. Many farmers complained about Monsanto's claims about the superiority and performance of the genetically engineered cotton. The government revealed that more than 70 percent of the Bt crop locations did not produce the promised expected yields. Some Bt cotton growers confirmed that they harvested around 500 kilograms per hectare, whereas Monsanto repeatedly boasted that its GM cotton would yield three tons per hectare.

*“There are two possibilities for my cotton harvest: I will keep it until decayed or I will burn it, even though I might lose in production cost and effort, rather than sell it to Monsanto.”*

Baco, a farmer in Manyampa village, South Sulawesi.

ten years later: broken promises and unsustainable agriculture **four**

## monsanto kicked out of south sulawesi, indonesia

Indonesia is a major importer of cotton, a raw material for its huge textile industry. In 1999, Bt cotton was approved by the Indonesian government and declared environmentally safe for planting in the country.

#### bt cotton in south sulawesi

In 2000, forty tons of genetically modified cottonseeds from South Africa arrived at the airport in Makassar, South Sulawesi. The seeds

were imported by PT Monagro Kimia, the Indonesian subsidiary of Monsanto. The seed, developed by Monsanto, is known as “Bollgard”, and “Bt” refers to the gene for an insect-killing toxin isolated from the soil microbe *Bacillus thuringiensis* (Bt) and inserted into the cottonseed.

The seeds were trucked away under armed guard, to be sold to farmers in seven districts in the province. Opposition was strong from the very beginning. Local NGO activists opposing the imports tried to block the trucks leaving the airport, and protested against the use of the Indonesian military police to guard the vehicles. Activists said that the seed should be quarantined for detailed examination before distribution, and accused the company of attempting to disguise what they were doing by using trucks marked “rice delivery”. Protests continued in 2001, and hundreds of farmers and NGO activists joined a demonstration led by the Indonesian Federation of Peasants' Unions calling for a boycott of GM seeds and GM products.

#### monsanto pulls out of south sulawesi

In December 2003, the Indonesian Minister of Agriculture finally announced that Monsanto had pulled out of South Sulawesi after three years of field experiments there. In fact, the company had already stopped supplying seeds to the farmers in February of that year. One of Monsanto's reasons for withdrawing was that its cotton business in South Sulawesi was no longer economically viable.

The majority of farmers are pleased about Monsanto's departure, as they suffered losses with the GM cotton. In fact many farmers' groups had stopped planting Monsanto products long before the seed supply was stopped in February 2003.

more information: Organic Consumers Association: [www.organicconsumers.org/gefood/IndonesiaCotton.cfm](http://www.organicconsumers.org/gefood/IndonesiaCotton.cfm)





#### testimony by ibu santi profile, an indonesian farmer who burned her cotton fields

"My name is Santi. I am a farmer and the head of a women farmers group in Bulukumba, South Sulawesi. One year ago, officers from the plantation office came to my door and persuaded me to plant Bt cottonseeds in our 25 hectares of farm land. They told me that it will yield a good harvest, a productivity of 4 to 7 tons per hectare. They said the company, Branita Sandhini [a subsidiary of Monsanto] that provides us with the seeds and fertilizers through credit schemes will buy our harvest at a good price, so we can pay our debt to the company and improve our welfare. So, despite my farmers group's doubt and our limited experience in cotton planting, I encouraged them to alter the cornfield into a Bt cotton field. For the sake of our welfare, to improve our future.

But that was a lie. Good harvest was nothing more than illusion. The harvest was very poor, just 2-3 rugs (around 70-120 kilograms) for each hectare. Far from helping, the company then raised the price of the seeds and fertilizer before the harvesting time and forced us to agree to that one-sided decision by signing the letter of agreement. If we didn't sign the letter, the company refused to measure or buy our harvest. The company didn't give the farmer any choice, they never intended to improve our well being, they just put us in a debt circle, took away our independence and made us their slave forever. They try to monopolize everything, the seeds, the fertilizer, the marketing channel and even our life.

I refused it. We, I and my fellow group members, did not deserve this kind of fate. Many other farmers and their groups chose to surrender their independence but we didn't. Instead of signing the letter, we burned our cotton. We were angry

about the company's dirty tricks, unfair treatment and empty promises. We demand justice so we burned our cotton to make the message clear. We are not bluffing. We know that we're risking our life by taking this position through the tide of intimidation and threat from local government and security officers, but we'd rather die protecting our right than surrendering it to the hands of the company that has deceived us.

This is my testimony. A testimony that was based on my bitter experience, a traumatic one. The practice of Bt cotton planting has given us more harm than good. Many of my fellow farmers have experienced the same things. Their voices were unheard, covered by the company's lies and our local government's repudiation that put the blame on our limited knowledge and experience. I speak for them, the unheard voices, for the injustice that they get so that we can learn from the truth."

source: Konphalindo

## secrecy, suspicion and failure linked to gm corn in spain



© Greenpeace/Garrasco

Spain, the only country in the EU in which genetically modified crops are grown for commercial purposes, has been cultivating GM crops for six years. Since 1998, an estimated 25,000 hectares have been planted each year with a genetically modified variety of corn (Bt176) sold by the Swiss biotech company Syngenta. The corn has been engineered to resist the European corn borer, a potentially harmful insect for maize.

The cultivation of GM corn varieties in Spain is taking place with a total lack of information. No official data is available on the locations or exact acreage planted with GM crops, nor has there been an independent analysis of GM crop results or of their possible negative impacts for the environment or agriculture in general. Furthermore, the introduction of GM crops has happened in an atmosphere of secrecy, suspicion and fear in rural areas, where farmers

and cooperatives afraid of losing markets or jobs refrain from speaking openly.

The few independent studies available show that pests can survive on Bt corn, and this means that they may become resistant to it. This casts doubts on the pest control efficiency of GM crops in the medium term, and endangers one of the natural pesticides used in organic farming. The impacts of GM corn on non-target species and soil ecosystems also remain unknown. The same goes for the effects of antibiotic resistance genes on animals and humans, simply because no independent monitoring has been carried out on these issues.



### quiet contamination

Two cases of genetic contamination were announced in 2001, and they probably represent only the tip of the iceberg. Without any measures in place to prevent genetic contamination and with no possibility for non-GM farmers to know where GM fields are located, it is to be expected that genetically modified material is flowing from GM to non-GM crops. However, the lack of monitoring, and the climate of fear that stifles the acknowledgement of genetic pollution by farmers, result in an unknown extent of contamination.

It has not been proven that the GM varieties cultivated in Spain give better results than conventional crops, nor that they are necessary, nor that they are useful for pest control. Studies have shown that yields for the GM crops are substantially lower than yields

for comparable conventional varieties. For example, one study reported that the GM corn had a 25 percent smaller yield than the top yielding variety in 1999. Furthermore, according to the Spanish government's working group on pesticides, corn borer incidence in Spain is "low" and "does not justify the use of these GM varieties".

The most worrying aspects of the introduction of GM corn in Spain are the social consequences. Although never addressed as a real issue, these include economic damage due to contamination by GMOs, liability problems for farmers, farmers' increasing dependence on big companies, and loss of the consumer's and farmer's right to choose.

Six years of GM crops in Spain shows that the introduction of these new agricultural varieties has not contributed to the construction of a sustainable agricultural model. The lack of impressive agricultural results and the negative consequences (like genetic contamination and pest resistance) show that GM cultivation should stop, since it is neither economically nor environmentally sustainable. In addition, it is clear that GM crops are creating new problems for farmers, for specific business sectors and for consumers.

*more information:*

*Friends of the Earth Spain:*

[www.tierra.org/transgenicos/pdf/Algranoingles03-08.pdf](http://www.tierra.org/transgenicos/pdf/Algranoingles03-08.pdf)

*“This is the world’s worst case of contamination by genetically modified material because it happened in the place of origin of a major crop. It is confirmed. There is no doubt about it.”*

Jorge Soberón, Secretary of Mexico’s National Biodiversity Commission, April 2002.

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## contamination in corn’s mexican birthplace

*Landraces varieties of Mexican  
maize, Oaxaca, Mexico.*





*“Our seeds, our corn, are the basis of the food sovereignty of our communities. It’s much more than a food, it’s part of what we consider sacred, of our history, our present and future.”*

Pedro, Indigenous community member in Chihuahua.

boundaries and end up in other countries. StarLink corn for instance ended up contaminating the food supplies in Japan, South Korea, and Bolivia.

In 2001, a peer-reviewed article in *Nature* reported that traditional maize varieties in two Mexican states (Oaxaca and Puebla) were contaminated with DNA from genetically modified maize. It is illegal to cultivate GM maize in Mexico.

The suspected source of the contamination is the United States, since it exports large quantities of maize for food and feed purposes to Mexico. It is believed that Mexican farmers planted US GM maize intended for food and feed without knowing it was genetically modified.

Despite the seriousness of the contamination, there still is no clear plan of action to address this genetic pollution, nor to prevent it from



Mexico is the center of origin of maize, where the greatest diversity of this crop is found. Since GM crops were first commercialized in the United States, there have been many concerns in neighboring Mexico about the possible contamination of Mexican corn. Corn varieties have been developed by Indigenous and local farmer communities over thousands of years, and corn is one of the key reserves of genetic material for plant breeding, the basis of food security. Maize diversity is key for farmer communities and plant breeders, and is needed for improving the quality and productivity of corn crops worldwide. Mexico also hosts the world’s most important collection of endangered corn seeds.

In 2001, the area in the US cultivated with GM corn was over 20 million acres, constituting over 50 percent of all corn cultivated in the country. Many cases of transboundary contamination have shown that illegal GMOs can easily cross

happening again. Moreover, monitoring done by civil society organizations in over 130 local communities in Mexico found that contamination occurred in nine states, seven more than the initial research showed. The organizations also claim to have identified StarLink GM maize, which is not authorized as food.

source and more information:  
Action Group on Erosion, Technology and Concentration (ETC):  
[www.etc.org](http://www.etc.org)

source: Farm Scale Evaluation Report:  
[www.defra.gov.uk/environment/gm/fse/results/fse-commentary.pdf](http://www.defra.gov.uk/environment/gm/fse/results/fse-commentary.pdf)

more information:  
Friends of the Earth England, Wales and  
Northern Ireland:  
[www.foe.co.uk](http://www.foe.co.uk)

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## uk field trials show mixed results



In 1999, the UK government asked a consortium of researchers to investigate how growing GM crops might affect the abundance and diversity of farmland wildlife compared with growing conventional varieties of the same crops. The results were intended to help the government decide whether to allow such GM crops to be grown commercially in the UK, but were never meant to be the sole factor in this decision. The researchers studied three genetically modified herbicide-tolerant (GMHT) and conventional crops: beet, oilseed rape and maize. The effects of these crops on weeds and invertebrates were investigated across the UK for three growing seasons during the period 2000-02.

© Jens Christiansen



rape and GM beet were commercialized would lead to the skylark becoming extinct in two decades due to lack of food. Two common weeds and important sources of food for wildlife, fat hen and chickweed, could disappear in half a century.

In contrast, these same weeds might increase in abundance following a shift from conventional to GMHT maize cropping due to the greater weed control exerted by conventional herbicide regimes compared to those used with the GMHT crops. However, the validity of the maize trials was put into doubt when, a week before the results were

### **mixed results for butterflies and bees**

The British researchers found that growing conventional beet and spring oilseed rape was better for many groups of wildlife than were the GM equivalents. There were more insects, such as butterflies and bees, in and around the conventional crops because there were more weeds to provide food and cover. There were also more weed seeds; important in the diets of some animals, particularly birds. The long-term decline in weed seed banks is predicted to increase, causing “accelerated species decline” under GMHT crop regimes.

However, GMHT maize was better for many groups of wildlife than conventional maize. There were more weeds in and around the GMHT crops, more butterflies and bees around at certain times of year, and more weed seeds.

In general, conventional oilseed rape and beet fields were the richest in flora and fauna, with conventional maize crops the poorest. Effects were explained by the different herbicide regimes and were consistent between sites, farms, years and different initial levels of weeds

### **skylark extinct in 20 years?**

If these trends are maintained under widespread GMHT cropping, then the present herbicide regimes associated with GMHT beet and spring oilseed rape might exacerbate long-term declines of weeds, including species that are important food resources for many invertebrate, small mammal and bird species. A modeling exercise published by the Department for Environment, Food and Rural Affairs three days before the release of the farm-scale evaluation results predicted that the level of weed control possible if GM oilseed

published, the EU banned atrazine and simazine beginning in 2005. Weed control in seventy five percent of the non-GM crops in the farm-scale evaluations was with atrazine, so the trials were not a realistic comparison of the future options for maize.

A further criticism is that there was no serious attempt to assess the yield or quality of the crops grown. This means there is no way to establish whether the biodiversity gains seen in the GMHT maize would ever be acceptable in commercial practice; it is doubtful that commercial GM crops will ever be managed like the ones in the evaluation. The most important time to control weeds is when the crop is at the seedling stage. In the non-GM part of the trials, herbicides were used to do just that whilst in the GM trials, herbicide application was deliberately delayed to allow weeds to develop.

*“The cost of cultivation for Bt cotton was 1092 Rupies (US\$24) more than that for non-Bt cotton because there was only a meager reduction in the pesticide consumption on Bt crops. On average, there was a significant reduction (35 percent) in the total yield of Bt cotton, while there was a net loss of 1295 Rupies (US\$28.50) in Bt cultivation in comparison with non-Bt cotton, where the net profit was 5368 Rupies (US\$118). Around 78 percent of the farmers who had cultivated Bollgard this year, said they would not go for Bt the next year.”*

‘Did Bt Cotton Save Farmers in Warangal? A season long impact study of Bt cotton’, Quayum, A. and Sakkhari K., 2002.

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## india's rotten experience with gm cotton

Monsanto's Bt cotton in  
Andhra Pradesh.



© geert ritsma



© geert ritsma





*"The company people came in the spring. They told me that I could make more money if I would start using the newest cotton seeds from the United States. They said I could get up to three times more cotton from my land. The first 60 days everything went fine. The new cotton was flowering abundantly. I was full of hope. But then the tide changed and my hope turned into despair. Heavy pest attacks started to occur. I started spraying the cotton, just like the company people told me. I applied fertilizer and irrigated the cotton field three times. But nothing worked. Most of the flowers dried out and the cotton bolls started falling off the plant. Eventually I only harvested four quintals (400 kilos), three times less than the company promised."*

**Somakka, a woman farmer from Andhra Pradesh, India, in January 2004. In 2003, Somakka bought GM cotton seed from Mahyco-Monsanto, a joint venture between the Indian company Mahyco and Monsanto. After her poor harvest she said she would never buy GM cotton again.**

Cotton farmers in Andhra Pradesh.



India provides an example of how a genetically modified crop, Bt cotton, did not live up to the promises made by biotech giant Monsanto.

Mahyco, a subsidiary of Monsanto, was authorized to release genetically modified cotton in India over a three-year period between April 2002 and March 2005. The company launched a huge propaganda drive promoting the excellent performance of Bt cotton. They defined Bt cotton as environmentally safe and economically beneficial as it would reduce pesticide use and cultivation costs and result in increased yields.

When the promotion of Bt cotton started in one of the states that cultivated GM cotton, Andhra Pradesh, many farmers bought the seed hoping to save money, despite the fact that the Bt cotton seeds cost more than conventional ones.

#### empty propaganda

Farmers in Andhra Pradesh grew 8,000 acres of Bt cotton crops in 2002. In early 2003, after one year of experience with commercial releases, the Minister of Agriculture of Andhra Pradesh declared that Bt cotton farmers had not benefited from Bt cotton. Many farmers were angry at the propaganda that had made them believe they were buying miracle seeds.

*"The cost of cultivation for Bt cotton was 1092 Rupies (US\$24) more than that for non-Bt cotton because there was only a meager reduction in the pesticide consumption on Bt crops. On average, there was a significant reduction (35 percent) in the total yield of Bt cotton, while there was a net loss of 1295 Rupies (US\$28.50) in Bt cultivation in comparison with non-Bt cotton, where the net*

*profit was 5368 Rupies (US\$118). Around 78 percent of the farmers who had cultivated Bollgard this year, said they would not go for Bt the next year."*

**'Did Bt Cotton Save Farmers in Warangal? A season long impact study of Bt cotton', Quayum, A. and Sakhari K., 2002.**

Other regions in India (including Madhya Pradesh, Maharashtra, Vidarbha, and Gujarat) had experiences similar to the one described in Andhra Pradesh. For example, initial reports from Madhya Pradesh claim that Bt cotton was a 100 percent failure, and farmers are demanding compensation from the company.



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**1. GM is a radical new technology, and GMOs are different from conventional organisms.** Although the United States and the biotech industry claim that GMOs are substantially equivalent to their conventional counterparts, they are increasingly isolated in this view. The Biosafety Protocol, a UN Treaty adopted in 2000 to regulate GM crops, confirmed that they are not equivalent and has established specific rules to regulate them.

**2. GMOs have been introduced without adequate understanding of their environmental, health and socioeconomic impacts.** Cases of contamination with illegal GM crops, like the 'StarLink', or 'biopharmaceuticals' debacles in the United States and the contamination of Mexican maize show how little we know about the impact or consequences of GM crops and releases.

**3. The first decade of commercialization of GMOs has been a failure for biotech corporations.** The biotech industry had expected people and governments everywhere to embrace GM crops without question, but public skepticism has forced them to limit their current activities to a few main countries. Biotech corporations failed to market products with clear benefits for consumers or farmers. Instead, GM crops created novel and alarming problems, including genetic contamination

Moreover, biotech companies and their powerful lobby groups relied heavily on PR strategies to sell their dream. For example, they heralded the genetically modified 'Golden Rice' as a solution for Vitamin A deficiency in the Third World, but to date this appears to be a 'golden hoax'. Behind the scenes, companies play dirty to secure their interests; for instance the biotech industry has been behind various threats of trade sanctions, including the attempts by the US to impose GM food on reluctant countries like Bolivia, Croatia and Sri Lanka and on the European Union.

**4. GM crops are increasing corporate control over agriculture.** Monsanto engineers and sells the vast majority of GM crops around the world. The right of farmers to save and use their own seeds, the foundation of agriculture, is under threat of being eliminated for the

## conclusions

Friends of the Earth believes that the first decade of the commercialization of GM crops has been a failure for biotech corporations. Between 1994 (when the first GM crop was commercialized in the US) and 2004, the promises made by biotech companies have not been fulfilled, and opposition to GM crops is growing stronger by the day. Given the experiences with GM crops in the past decade, we have come to the following conclusions:

first time since the creation of agriculture. The behavior of corporations like Monsanto in countries including the United States, Canada, and Indonesia shows some of the major negative consequences of monopolistic corporate control.

**5. Nations should have the right to impose bans on GM food, feed, or commercial growing.** Every country should have the right to adopt precautionary measures on GMOs, including bans and moratoria. Alliances between biotech companies and pro-biotech governments formed to threaten countries taking precautionary measures against GMOs with trade sanctions are outrageous and unethical.

**6. GM food is unfit to feed the world.** Biotech companies claim that GM food is needed to feed the world in order to convince the public of its necessity. This claim that GM crops are the answer to the hunger problem is refuted in the case of Argentina, where hunger persists despite vast acreages of GMO crops. It has also been discredited by an increasing number of development and farmers' organizations, scientists and developing agricultural countries.

**7. There is an urgent need to protect centers of origin and diversity.** In 2000, Bolivian civil society was successful in preventing field trials of GM potato in the country, which is a center of origin for the potato. In Mexico, the center of origin of maize, contamination of local maize with GM maize has recently been confirmed. This is worrisome, and requires urgent action. Centers of origin and diversity, as key reservoirs of agricultural biodiversity, must be preserved from genetic contamination, and countries hosting such centers must immediately create clear plans of action to prevent and address contamination.

**8. There is an urgent need for an international liability regime.** Current liability regimes are vastly insufficient. Industry must pay for genetic contamination and any other damage caused by the release of GM organisms in the environment. The launching of a class action lawsuit by Canadian organic farmers to make Monsanto and Aventis liable for genetic contamination is one example of the growing demand to make corporations liable for the damage they cause. It is crucial that a fast-track process be initiated under the international Biosafety Protocol with the goal of putting in place an international legally binding instrument to protect citizens against potential future damages caused by GMOs.

**9. GM crops conflict with sustainable agriculture and food security.** GM crops foster dependence on pesticides and encourage the use of monoculture agriculture, thus threatening the environment and endangering food security. They are furthering the industrialization of agriculture by focusing on the production of cash crops for the global market rather than the needs of local communities and the promotion

#### **glossary**

**Bt** *Bacillus thuringiensis* (Bt) is a toxin-producing gene taken from a soil bacterium which is used to engineer insect-resistant 'pesticide plants'.

**EU** European Union

**GE** Genetic engineering or genetically engineered

**GM** Genetic modification or genetically modified

**GMHT** Genetically modified herbicide tolerant

**GMOs** Genetically modified organisms

**HT** Herbicide-tolerant

**WFP** World Food Program

**WTO** World Trade Organization

**USAID** US Agency for International Development

**VAD** Vitamin A deficiency

#### *more information:*

*FoE Europe GMO Campaign:*

**[www.foeeurope.org/GMOs/Index.htm](http://www.foeeurope.org/GMOs/Index.htm)**

*FoEI GMO Campaign:*

**[www.foei.org/gmo/index.html](http://www.foei.org/gmo/index.html)**

of agricultural biodiversity. Agricultural biodiversity plays a key role in food security and food sovereignty. The large-scale introduction of GM crops would exacerbate the ecological vulnerability already associated with monoculture agriculture.

**10. There are viable and practical alternatives to GM crops** which are almost invariably cheaper, more accessible, more productive in marginal environments and more culturally and socially acceptable.

To conclude, citizen opposition to GMOs is snowballing. In Europe, distrust is so high that GMOs have in effect been removed from the majority of supermarket shelves. In the South, many countries in Latin America, Africa, and Asia have rejected GM food aid outright. Consumer and retailer suspicion has forced Monsanto to delay the commercialization of its GM wheat, initially planned for 2004. The failure of biotech companies in the last decade and the growing global opposition should catalyze a shift of focus to alternative, reliable agricultural techniques that are less costly than the multi-billion dollar modern biotechnology industry.

