THE GMO EMPEROR HAS NO CLOTHES

A Global Citizens Report on the State of GMOs

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A Global Citizens Report on the State of GMOs - False Promises, Failed Technologies

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Coordinated by Navdanya and Navdanya International,
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The GMO Emperor Has No Clothes

The Emperor's New Clothes is a story by Hans Christian Andersen about an emperor who hires two tailors who promise to make him a set of remarkable new clothes that will be invisible to anyone who is either incompetent or stupid. When the emperor goes to see his new clothes, he sees nothing at all — for the tailors are swindlers and th ere aren't any clothes. Afraid of being judged incompetent or stupid, the emperor pretends to be delighted with the new clothes and "wears" them in a grand parade through the town. Everyone else also pretends to see them, until a child yells out, "He hasn't got any clothes on!" However, the Emperor, arrogantly continues parading with his courtiers as though there was no problem.

Hans Christian Andersen's fable is an apt parody for what is happening today with genetically modified organisms (GMOs) in food and agriculture. The GMO Emperor Monsanto has no clothes: its promises to increase crop yields and feed the hungry have proven to be false; its genetic engineering to control weeds and pests have created super weeds and super pests. Yet the Emperor struts around hoping the illusion will last and the courtiers, not wanting to be seen as stupid, will keep applauding and pretending they see the magnificent robes of the GMO emperor.

The fable that GMOs are feeding the world has already led to large-scale destruction of biodiversity and farmers' livelihoods. It is threatening the very basis of our freedom to know what we eat and to choose what we eat. Our biodiversity and our seed freedom are in peril. Our food freedom, food democracy and food sovereignty are at stake.

Citizens around the world can see the false promises and failures of GMOs. And like the child who speaks up, are proclaiming "What the Emperor is telling us is not true. It is an illusion. The GMO Emperor has no clothes".

Joining together to say that "The GMO Emperor has no clothes" empowers citizens to create a GMO-free world, rich in biodiversity and healthy food. It also advances alternatives that are truly sustainable and provides food security and food democracy for all.

CONTENTS

The Synthesis Report of the Emperor Has No Clothes : Global Citizens Report on GMOs – False Promises, Failed Technologies, is available in hard copy . The full Report is available on the web at: www.navdanyainternational.it.
The Synthesis Report includes Sections I, II, III, VI and VII of the full Report as well as quotes from authors of articles from section IV, Voices from Grass Roots and section V, Voices from Science.

I. INTRODUCTION

Dr. Vandana Shiva*

People who point out the emptiness of the pretensions of powerful people and institutions are often compared to the child in Hans Christian Andersen's fable who says that the emperor has no clothes.

We have been repeatedly told that genetically engineered (GE) crops will save the world by increasing yields and producing more food. They will save the world by controlling pests and weeds. They will save the world by reducing chemical use in agriculture. They will save the world with GE drought tolerant seeds and other seed traits that will provide resilience in times of climate change.

However, the GE emperor (Monsanto) has no clothes. All of these claims have been established as false over years of experience all across the world. The Global Citizens Report "The GMO Emperor Has No Clothes" brings together evidence from the ground of Monsanto's and the industry's false promises and failed technology.

Failure to Yield

Contrary to the claim of feeding the world, genetic engineering has not increased the yield of a single crop. Navdanya's research in India has shown that contrary to Monsanto's claim of Bt cotton yield of 1500 kg per acre, the reality is that the yield is an average of 400-500 kg per acre. Although Monsanto's Indian advertising campaign reports a 50 percent increase in yields for its Bollgard cotton, a survey conducted by the Research Foundation for Science, Technology and Ecology found that the yields in all trial plots were lower than what the company promised.

Bollgard's failure to deliver higher yields has been reported all over the world. The Mississippi Seed Arbitration Council ruled that in 1997, Monsanto's Roundup Ready cotton failed to perform as advertised, recommending payments of nearly $2 million to three cotton farmers who suffered severe crop losses.

Failure to Yield, a report by the Union of Concerned Scientists in the U.S., has established that genetic engineering has not contributed to yield increases in any crop. According to this report, increases in crop yields in the U.S. are due to yield characteristics of conventional crops, not genetic engineering.
Australian research shows that conventional crops outperform GE crops.

Yield Comparison of GE Canola trials in Australia

	2001	
Conventional	1144	
Round Up Ready GE	1055	(Two application of Round Up)
	977	(One application of Round Up)

(Source: Monsanto, as reported in Foster (2003) – *http://www.non-gm-farmers.com/documents/GM Canola report-full.pdf*

New South Wales	**2001**
In Vigor (GE)	109
Hyola (Conventional)	120

(Source: Bayer Crop Science Website)

Despite Monsanto adding the Roundup Ready gene to 'elite varieties', the best Australian trials of

Roundup Ready Canola yielded only 1.055 t/ha, at least 16 percent below the national average of 1.23 t/ha *(http://www.non-gm-farmers.com/documents/GM Canola report-full.pdf)*.

As Marc Lappe and Britt Bailey report in their book Against the Grain, herbicide-resistant soybeans yielded 36 to 38 bushels per acre, while hand tilled soybeans yielded 38.2 bushels per acre. According to the authors, this raises the possibility that the gene inserted into these engineered plants may selectively disadvantage their growth when herbicides are not applied. "If true, data such as these cast doubt on Monsanto's principal point that their genetic engineering is both botanically and environmentally neutral," the authors write. (Marc Lappe and Britt Bailey, *Against the Grain: Biotechnology and the Corporate Takeover of Your Food*, Monroe, ME: Common Courage Press, 1998).

While increased food productivity is the argument used to promote genetic engineering, when the issue of potential economic impacts on farmers is brought up, the biotechnology industry itself argues that genetic engineering does not lead to increased productivity. Robert Shapiro, CEO of Monsanto, referring to Posilac (Monsanto's bovine growth hormone) in Business Ethics, said on the one hand that "There is need for agricultural productivity, including dairy productivity, to double if we want to feed all the people who will be joining us, so I think this is unequivocally a good product." On the other hand, when asked about the product's economic impact on farmers, he said that it would "play a relatively small role in the process of increasing dairy productivity."

In twenty years of commercialization of GE crops, only two traits have been developed on a significant scale: herbicide tolerance, and insect resistance (Bt crops).

Failed Technology: GE crops do not control pests and weeds, they create super pests and super weeds

Herbicide tolerant (Roundup Ready) crops were supposed to control weeds and Bt crops were intended to control pests. Instead of controlling weeds and pests, GE crops have led to the emergence of super weeds and super pests. In the U.S., Round Up Ready crops have produced weeds resistant to Round Up. Approximately 15 million acres are now overtaken by Roundup resistant "superweeds", and, in an attempt to stop the spread of these weeds, Monsanto has started offering farmers a "rebate" of up to $6 per acre for purchasing and using other, more lethal herbicides. These rebates offset approximately 25 to 35 percent of cost of purchasing the other herbicides. [1]

In India, Bt cotton sold under the trade name "Bollgard" was supposed to control the Bollworm pest. Today, the Bollworm has become resistant to Bt cotton and now Monsanto is selling Bollgard II with two additional toxic genes in it. New pests have emerged and farmers are using more pesticides.

Bt crops: A Recipe for Super Pests

Bt is a naturally occurring organism Bacillus thuringiensis which produces a toxin. Corporations are now adding genes for Bt toxins to a wide array of crops to enable the plants to produce their own insecticide.

Monsanto sells its Bt potato as 'Nature Mark' in Canada and describes it as a plant using "sunshine, air and soil nutrients to make a biodegradable protein that affects just one specific insect pest, and only those individual insects that actually take a bite of the plants."

The camouflaged description of a transgenic crop hides many of the ecological impacts of genetically engineered crops. The illusion of sustainability is manufactured through the following distortions.

1. The Bt Plant does not merely use 'sunshine, air, and soil nutrients'. Bt crops are transgenic and have a gene from a bacterium called bacillus thuringiensis (bt) which produces the Bttoxin. In addition it has antibiotic resistance marker genes and genes from viruses as promoters.
2. The so called 'biodegradable protein' is actually a toxin which the gene continuously produces in the plant. This protein has been found in the blood of pregnant women and their fetuses.
3. Insect pests like the cotton bollworm which destroy cotton can actually evolve resistance because of continuous release of the toxin and hence become 'super pests'.
4. The Bt crop does not affect 'just one specific pest'. Beneficial insects like bees and ladybirds can be seriously affected. A Cornell study showed that the Bt toxin affected the Monarch

[1] http://blogs.desmoinesregister.com/dmr/index.php/2010/10/19/monsanto-paying-farmers-to-increase-herbicide-use/

butterfly. Navdanya's studies have shown that soil micro-organisms are negatively affected.

The primary justification for the genetic engineering of Bt into crops is that this will reduce the use of insecticides. Bt cotton is among the 'miracles' being pushed by corporations like Monsanto as a solution to the pesticide crisis. One of the Monsanto brochures had a picture of a few worms and stated, "You will see these in your cotton and that's O.K. Don't spray." However, in Texas, Monsanto faced a lawsuit filed by 25 farmers over Bt cotton planted on 18,000 acres which suffered cotton bollworm damage and on which farmers had to use pesticides in spite of corporate propaganda that genetic engineering meant an end to the pesticide era. In 1996, two million acres in the US were planted with Monsanto's transgenic Bollgard cotton.

However, cotton bollworms were found to have infested thousands of acres planted with the new breed of cotton in Texas. Not only did the genetically engineered cotton not survive cotton bollworm attack, there are also fears that the strategy will create super bugs by inducing Bt – resistance in pests. The question is not whether super-pests will be created, but when they will become dominant. The fact that the Environmental Protection Agency (EPA) of the US requires refugia of non-engineered crops to be planted near the engineered crops reflects the reality of the creation of resistant strains of insects.

The widespread use of Bt containing crops could accelerate the development of insect pest resistance to Bt which is used for organic pest control. Already eight species of insects have developed resistance to Bt toxins, either in the field or laboratory, including the diamond back moth, Indian meal moth, tobacco budworm, Colorado potato beetle, and two species of mosquitoes.

A new Super Pest which has become Resistant to GM Corn

The genetically engineered Bt crops continuously express the Bt toxin throughout its growing season. Long term exposure to Bt toxins promotes development of resistance in insect populations, this kind of exposure could lead to selection for resistance in all stages of the insect pest on all parts of the plant for the entire season.

Due to this risk of pest resistance, the EPA offers only conditional and temporary registration of varieties producing Bt. The EPA requires four percent 'refugia' with Bt cotton, meaning four percent of planted cotton is conventional and does not express the Bt toxin. It therefore acts as a refuge for insects to survive and breed, and hence keeps the overall level of resistance in the population low. Even at a 4 percent refugia level, insect resistance will evolve in as little as three to four years.

Herbicide Resistant Crops: A Recipe for Superweeds

Herbicide resistant crops such as Roundup Ready cotton can create the risk of herbicide resistant "superweeds" by transferring the herbicide resistance to weeds. Monsanto has confirmed that a notorious Australian weed, rye grass, has developed tolerance to its herbicide Roundup, thus rendering genetic engineering of herbicide resistant crops a useless strategy.

In 1994, research scientists in Denmark reported strong evidence that an oilseed rape plant genetically engineered to be herbicide tolerant transmitted its transgene to a weedy natural relative, Brassica campestris ssp. Campestris. This transfer can become established in the plant in just two generations.

In Denmark, B. campestris is a common weed in cultivated oilseed rape fields, where selective elimination by herbicides is now impossible. The wild relative of this weed is spread over large parts of the world. One way to assess the risk of releasing transgenic oilseed rape is to measure the rate of natural hybridization with B. campestris, because certain transgenes could make its wild relative a more aggressive weed, and even harder to control.

Although crosses with B. campestris have been used in the breeding of oilseed rape, natural interspecific crosses with oilseed rape was generally thought to be rare. Artificial crosses by hand pollination carried out in a risk assessment project in the U.K were reported unsuccessful. However, a few studies have reported spontaneous hybridization between oilseed rape and the parental species B. campestris in field experiments. As early as 1962, hybridization rates of zero percent to 88 percent were measured for oilseed rape and

wild B. campestris. The results of the Danish team showed that high levels of hybridization can occur in the field. Their field tests revealed that between nine percent and 93 percent of hybrid seeds were produced under different conditions. (Jorgensen, R.B and Anderson, B., (1994), "Spontaneous Hybridization between oilseed rape (Brassica Napus) and weedy B.Campestriz (Brassicaceae): A risk of growing genetically modified oilseed rape", American Journal of Botany).

The scientists also warn that as the gene for herbicide resistance is likely to be transferred to the weed, this herbicide strategy will be useless after a few years. Like many other weeds, B. campestris is characterized by seed dormancy and longevity of the seeds. Therefore, B. campestris with transgenes from oilseed rape may be preserved for many years in spite of efforts to exterminate it. They conclude that weedy B. campestris with this herbicide tolerant transgene may present economic risks to farmers and the biotechnology industry. Finally, natural ecosystems may also be affected.

Other concerned scientists add that the potential spread of the transgene will indeed be wide because oilseed rape is insect-pollinated and bees are known to fly far distances. The existence of the wild relative of B. campestris in large parts of the world poses serious hazards once the transgenic oilseed rape is marketed commercially. In response to the Danish findings, the governments of Denmark and Norway have acted against the commercial planting of the engineered plant, but the U.K Government has approved its marketing.

Wild beets have become a major problem in European sugar beet production since the 1970s. These weedy populations arise from seeds originating from the accidental pollinations of cultivated beets by adventitious beets in the seed production area. The existence of gene exchange via seed and pollen between weed beets and cultivated beets shows genetically engineered sugar beets to be herbicide resistant, with the possibility of becoming "super-weeds." In this case, the efficacy of herbicide resistant crops totally undermined. (P. Bondry, M. Morchen, P. Sanmiton-Laprade, Ph. Veernat, H.Van Dyk, "The origin and evolution of weed beets: Consequences for the breeding and release of herbicide resistant transgenic sugar beets: Theor-Appl Genet (1993), 87:471-78).

Current surveys indicate that almost 20 percent of U.S producers have found glyphosate resistant (Roundup Resistant) weeds on their farms. *(http://farmindustrynews.com/crop-protection/diversification-prevents-weed-resistance-glyphosate)*

Referring to Round Up Resistant weeds, Andrew Wargo III, the President of the Arkansas Association of Conservation Districts said, "It is the single largest threat to production agriculture that we have ever seen". (William Neuman & Andrew Pollack, Farmers Cope with Round-Up Resistance Weeds, New York Times, 4th May 2010).

There are now ten resistant species in at least 22 states infesting millions of acres, predominantly soybeans, cotton, and corn. Roundup Resistant weeds include pig weed, rag weed, and horse weed.

Today, Roundup Ready crops account for 90 percent of soybeans and 70 percent of corn and cotton grown in the US.
Mike Owen, a Weed Scientist at Iowa State University has cautioned: "What we're talking about here is Darwinian evolution in fast-forward."

As a result of this weed resistance, farmers are being forced to use more herbicides to combat weeds. As Bill Freese of the Center for Food Safety in Washington, D.C., says "The biotech industry is taking us into a more pesticide dependent agriculture, and we need to be going in the opposite direction."
The problem of "superweeds" is so severe that U.S Congress organized a hearing on it titled "Are Superweeds an Outgrowth of USDA Biotech Policy".
(http://westernfarmpress.com/management/super-weeds-put-usda-hotseat)

Superweeds infest a GM corn field

As Roy Troush, an Indiana farmer, stated in his testimony: "In 2005 we first began to encounter problems with glyphosate-resistance in both our soybean and corn crops. Despite well documented proof that glyphosate tolerant weeds were becoming a significant problem, the Monsanto

scientist insisted that resistance existed and instructed me to increase my application rates. The increase in application proved ineffectual. In 2008, we were forced to include the use of 2,4-D and an AIS residual in our program. Like most farmers, we are very sensitive to environmental issues, and we were very reluctant to return to using tillage and more toxic herbicides for weed control. However, no other solutions were then or now readily available to eradicate the weed problems caused by development of glyphosate resistance".

When introduced to regions such as China, Taiwan, Japan, Korea and former USSR where wild relatives of soy are found, Monsanto's Roundup Ready Soya bean could transfer the herbicide resistant genes to wild relatives leading to new weed problems.

The native biodiversity richness of the Third World thus increases the environmental risks of introduced genetically modified species.

The genetic engineering miracle is quite clearly faltering in farmers' fields. Yet the information on the hazards and risks does not accompany the sales promotion of genetically engineered crops in India. Nor does the false promise of the biotech miracle inform farmers that the genetic engineering era of farming also requires 'high-tech slavery' for farmers.

False Promises

1. Reduced Use of Chemicals

Despite claims that genetically modified organisms (GMOs) will lower the levels of chemicals (pesticides and herbicides) used, this has not been the case. This is of great concern both because of the negative impacts of these chemicals on ecosystems and humans, and because there is the danger that increased chemical use will cause pests and weeds to develop resistance, requiring even more chemicals in order to manage them.

In India:

- A survey conducted by Navdanya in Vidharbha showed that pesticide use has increased 13-fold there since Bt cotton was introduced.
- A study recently published in the Review of Agrarian Studies also showed a higher expenditure on chemical pesticides for Bt cotton than for other varieties for small farmers. (*Are there Benefits from the Cultivation of Bt cotton?* Review of Agrarian Studies Vol 1(1) January-June 2011. Madhura Swaminathan* and Vikas Rawal)
- Non-target pest populations in Bt cotton fields have exploded, which will likely erode and counteract any decrease in pesticide use (Glenn Davis Stone. *Field versus Farm in Warangal: Bt cotton, Higher Yields, and Larger Questions.* World Development, 2011; 39 (3): 387)

In China, where Bt cotton is widely planted:

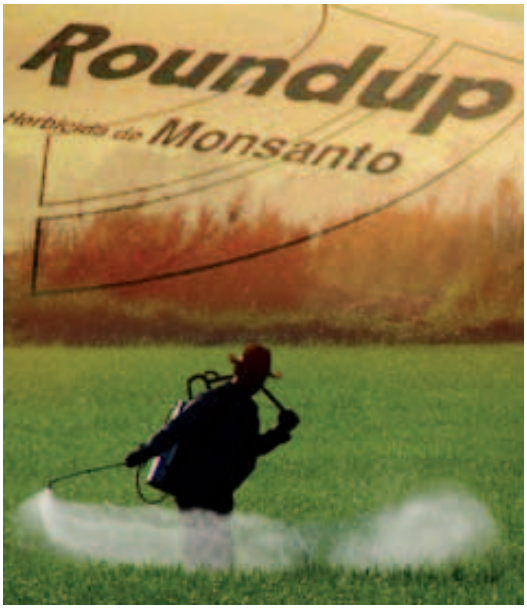
- Populations of mirid bugs, pests that previously posed only a minor problem, have increased 12-fold since 1997. A 2008 study in the International Journal of Biotechnology found that any financial benefits of planting Bt cotton had been eroded by the increasing use of pesticides needed to combat non-target pests. ("Benefits of Bt cotton elude farmers in China" GM Watch, *http://www.gmwatch.org/latest-listing/1-news-items/13089*).

In the US, due mainly to the widespread use of Roundup Ready seeds:

- Herbicide use increased 15 percent (318 million additional pounds) from 1994 to 2005—an average increase of ¼ pound per each acre planted with GM seed—according to a 2009 report published by the Organic Center. (*http://www.organic-center.org/science.pest.php?action=view&report_id=159*).
- The same report found that in 2008, GM crops required 26 percent more pounds of pesticides per acre than acres planted with conventional varieties, and projects that this trend will continue due to the spread of glyphosate-

resistant weeds. (*http://www.organic-center.org/science.pest.php?action=view&report_id=159)*.

- Moreover, the rise of glyphosate (the herbicide in Roundup Up)- resistant weeds has made it necessary to combat these weeds by employing other, often more toxic herbicides. This trend is confirmed by 2010 USDA pesticide data, which shows skyrocketing glyphosate use accompanied by constant or increasing rates of use for other, more toxic, herbicides. (Despite Industry Claims, Herbicide Use Fails to Decline with GM Crops." GM Watch. *http://www.gmwatch.org/latest-listing/1-news-items/13089*)
- Moreover, the introduction of Bt corn in the US has had no impact on insecticide use, and while Bt cotton is associated with a decrease in insecticide use in some areas, insecticide applications in Alabama, where Bt cotton is planted widely, doubled between 1997 and 2000. (Benbrook, Charles. "Do GM Crops Mean Less Pesticide Use?" Pesticide Outlook, October 2001. *http://www.biotech-info.net/benbrook_outlook.pdf*).



In Argentina, after the introduction of Roundup Ready soya in 1999:

- Overall glyphosate use more than tripled by 2005. A 2001 report found that Roundup Ready soya growers in Argentina used more than twice as much herbicide as conventional soya growers. ("Who Benefits from GM Crops? Feed the Biotech Giants, Not the World's Poor." Friends of the Earth International, February 2009). *(http://www.foei.org/en/resources/publications/pdfs/2009/gmcrops2009exec.pdf)*
- In 2007, a glyphosate-resistant version of Johnsongrass (considered one of the worst and most difficult weeds in the world) was reported on more than 120,000 hectares of prime agricultural land - a consequence of the increase in glyphosate use. (Ibid)

As a result, it was recommended that farmers use a mix of herbicides other than glyphosate (often more toxic) to combat the resistant weeds, and it is estimated that an additional 25 liters of herbicides will be needed each year to control the resistant weeds. (Ibid).

In Brazil, which has been the worlds' largest consumer of pesticides since 2008:
("Use of Pesticides in Brazil continues to Grow." GM Watch, April 18 2011. *http://www.gmwatch.org/latest-listing/1-news-items/13072-use-of-pesticides-in-brazil-continues-to-grow*).

- GE crops became legally available in 2005, and now make up 45 percent of all row crops planted in Brazil — a percentage that is only expected to increase. (Brazilian Farmers are Rapidly Adopting Genetically Modified Crops." Soybean and Corn Advisor, March 10, 2010. http://www.soybeansandcorn.com/news/Mar10_10-Brazilian-Farmers-Are-Rapidly-Adopting-Gentically-Modified-Crops)
- Soy area has increased 71 percent, but herbicide use has increased 95 percent. ("GM Agriculture: Promises or Problems for farming in South Africa?" (BioWatch South Africa, May 16 2011. *http://www.sacau.org/hosting/sacau/SacauWeb.nsf/SACAU 2011_Biowatch- GM agriculture Promises or problems for farming in South Africa.pdf*)
- Of 18 herbicide-resistant weed species reported, five are glyphosate-resistant. ("Use of Pesticides in Brazil continues to Grow." GM Watch, April 18 2011. *http://www.gmwatch.org/latest-listing/1-news-items/13072-use-of-pesticides-in-brazil-continues-to-grow*)
- In 2009, total herbicide active ingredient use was 18.7 percent higher for GE crops than conventional ("GM Crops: Global socio-economic and environmental impacts 1996-2009" Graham Brookes and Peter Barfoot. PG Economics Ltd. UK. 2011).

2. Climate Resilience

Monsanto has been claiming that through genetic engineering it can breed crops for drought tolerance and other climate-resilient traits. This is a false promise. As the U.S. Department of Agriculture (USDA) has said in its draft

environmental assessment of the new drought-resistant GE corn, "Equally comparable varieties produced through conventional breeding techniques are readily available in irrigated corn production reviews." ("USDA Looks to Approve Monsanto's Draught-Tolerant Corn," *The New York Times*, May 11, 2011.)

Helen Wallace of GeneWatch UK cautions: "The GE industry must now stop its cynical attempts to manipulate the public into believing that GE crops are needed to feed the world." (GeneWatch UK press release, "Draught-Tolerant GM Corn Will Not Feed the World," May 13, 2011.)

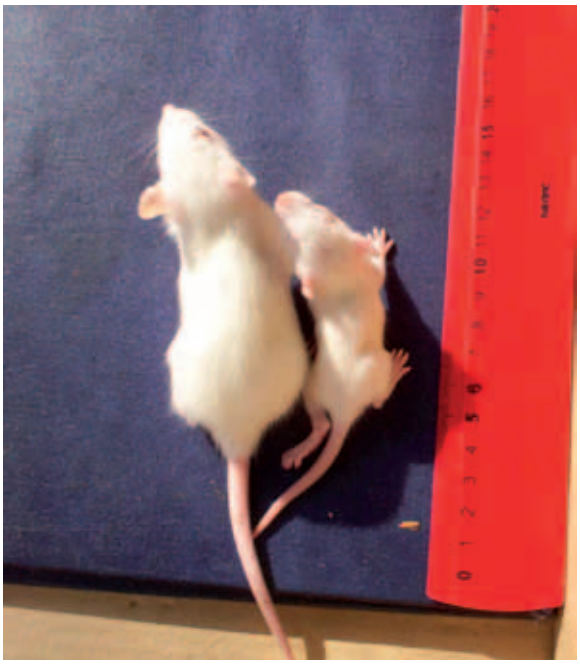
Other biotech industries also falsely claim that they are inventing climate resilient traits. As Ram Kaundiya, CEO of Advanta, India and Chairman of Biotech Led Enterprises – Agriculture Group - writes, "Very exciting input traits are in the pipeline. For example, a water use efficiency trait will reduce the water requirements of the crops considerably and can help vast numbers of farmers who cultivate rainfed crops in the country in more than 100 million ha. Similarly, the nitrogen use efficiency trait which will reduce the use of nitrogenous fertilizer on the crops by an estimated 30 percent. Another trait that is waiting in the wings is a salt tolerance trait which can help farmers grow crops in saline soils of more than 20 million ha in India." There are 1600 patents on climate resilient crops (Biopiracy of Climate Resilient Crops: Gene Giants Steal Farmers Innovation of Drought Resistant, Flood Resistant and Soil Resistant Varieties, Navdanya/ RFSTE, June 2009 & *www.etcgroup.org*)

But all these traits have already been evolved the traditional way by Indian farmers. Navdanya's seed collections have drought tolerant varieties like Nalibakuri, Kalakaya, Atia, Inkiri etc., flood tolerant varieties like Nalidhulia, Ravana, Seulapuni, Dhosarakhuda etc., and salt tolerant varieties like Bhundi, Kalambank, Lunabakada, Sankarchin etc.

Pulses and beans are nitrogen fixing crops. None of these traits are "invented" by genetic engineering. They are pirated from nature and farmers.

3. Health Safety

While the GE Emperor has no clothes—i.e., GE crops cannot feed the world, it has the potential for harming the world and enslaving the world. Among the false claims made by Monsanto and the Biotechnology industry is that GE foods are safe. However, there are enough independent studies to show that GE foods can cause health damage.



Experiment by Irina Ermakova: influence of GM-soy (Roundup Ready) on same age rats : control group on left, GM-soy on right with pups small sizes and weights

For example, Dr. Arpad Pusztai's research has shown that rats fed with GE potatoes had enlarged pancreases, their brains had shrunk, and their immunity had been damaged. Dr. Eric Seralini's research demonstrated that organ damage can occur.

The Committee of Independent Research and Information on Genetic Engineering (CRIIGEN) and universities at Caen and Rouen were able to get raw data of Monsanto's 2002 feeding trials on rats at the European Council order and made it public in 2005. The researchers found that rats fed with three approved corn varieties of GE corn—Mon 863, insecticide products, Mon 810, and Roundup Ready herbicide —suffered organ damage. The data "clearly underlines adverse impacts on kidneys and liver, the dietary, detoxifying organs as well as different levels of damages to the heart, adrenal glands, spleen and haematopoietic systems," according to Dr. Gilles Eric Seralini, a molecular biologist at the University of Caen. ("A Comparison of the Effects of Three GM Corn Varieties on Mammalian Health," Joel Spiroux de Veu de Mois, Francois Roullier, Dominique Cellise, Gilles Eric Serelini, *International Journal of Biological Science*s, 2009, 5: 706-726).

The Biotechnology Industry attacked Dr. Pusztai and Dr. Seralini and every scientist who has done independent research on GMOs. GMOs cannot

co-exist with the independence and freedom of science.
A Canadian study showed that traces of the Bt toxin from Monsanto Bt corn were found in the blood of 93 percent of women and 80 percent of their umbilical cord and fetal blood (Aris A, Leblanc S, "Maternal and fetal exposure to pesticides associated to genetically modified foods in Eastern Township of Quebec, Canada", Reproductive Toxicology, May 31, 2011 (4) 526-33, Epub 2011 Feb/8).

Monsanto's false argument for safety was that the Bt toxin in Bt crops poses no danger to human health because the protein breaks down in the human gut. However, the study shows that the Bt toxin survives in the blood of pregnant women and is also detected in fetal blood.

Evidence of liver and kidney toxicity appeared when rats were fed an approved GE maize variety (Mon 863) (Seralini GE, Cellier D. & Spironx de Vendomois, J, 2007, "New analysis of rat feeding study with a GM Maize", Archives of Environmental Contamination and Toxicology, 10,1007, S 00244-006-0149-5). Similar effects were observed when Monsanto fed its GT-73 Roundup Ready canola variety to rats. The rats showed a 12 percent to 16 percent increase in liver weight. (Greenpeace (2004) "Greenpeace critique of Monsanto's Roundup Ready Oilseed rape, GT-73", *http://www.greenpeace.at/uploads/media/GT73_Greenpeace_comments_Oct_2004_01.pdf*).

In 2005 CSIRO abandoned a decade long project to develop GE peas after tests showed they caused allergic lung damage in mice. (Young E. (2005) GM Pea causes allergic damage in Mice, New Scientist, *http://www.newscientist.com/article/dn8347-gm-pea-causes-allergic-damage-in-mice.html*).

A survey was conducted by Navdanya under Bt cotton growing areas of Vidharbha. Twenty-five fields were selected where Bt cotton was grown for three years, which was compared with the adjoining fields where either other varieties of cotton were growing or other crops were growing during that period. The areas covered between Nagpur, Amravati, Wardha and adjoining areas. The result showed significant reduction in acid phosphatase (26.6 percent), nitrogenase (22.6 percent) and dehydrogenase (10.3 percent) activities under Bt cotton growing fields. A slight reduction in esterase (7.6 percent) and alkaline phosphatase (0.7 percent) activity was observed but the results are not statistically significant. The results clearly demonstrated that Bt cotton cultivation definitely affect soil biological health especially beneficial microorganisms (actinomycetes, bacteria) and enzymes (acid phosphatase, nitrogenase and dehydrogenase). (Effect on Soil Biological Activities due to Cultivation of Bt cotton, Navdanya, 2008).

Other statements and scientific studies done on the risks posed to human health by Bt:

- In general, main health concerns are toxicity and allergenicity.
- Even the World Health Organization (WHO) cautions that "Different GM organisms include different genes inserted in different ways. This means that individual GM foods and their safety should be assessed on a case-by-case basis and that it is not possible to make general statements on the safety of all GM foods."("20 Questions on Genetically Modified Foods." World Health Organization. *http://www.who.int/foodsafety/publications/biotech/20questions/en/*).
- Many studies have shown that Bt poses potential risks to insects and animals, but there has been little study of its potential impact on human health. ("Why GM Crops are Dangerous" People and Planet, February 5 2009. *http://www.peopleandplanet.net/?lid=29012&section=34&topic=27*).
- 1999 Nature study showed adverse effects of transgenic pollen (from Bt corn) on monarch butterflies: butterflies reared on milkweed leaves dusted with bt corn pollen ate less, grew more slowly, and suffered higher mortality. (J. Losey, LS. Rayor, M.E. Carter. "Transgenic pollen harms monarch larvae" Nature vol 399. May 20 1999).
- Evidence of organ damage: A 1999 study showed that rats fed GE potatoes experience adverse effects on their intestinal tracts. (SWB Ewen, A. Puzstai. "Effect of diets containing genetically modified potatoes expressing Galanthus nivalis lectin on rat small intestine." The Lancet, Vol 354 issue 9187, pages 1353-1354, 16 October 1999.). In addition, rats fed GE tomatoes developed stomach lesions, and rats fed a different kind of GM potatoes had smaller and atrophied livers. Rats fed Bt corn had liver lesions, and rabbits fed GE soy showed altered enzyme production in their livers as well as higher metabolic activity. Rats fed Roundup Ready soybeans also showed structural changes in their livers. (C Verma, S Nanda, RK Singh, RB Singh, and S Mishra. "A Review on Impacts of Genetically Modified Food on Human Health." The Open

Nutraceuticals Journal, 2011, 4, 3-11)
- Evidence of allergies in animal trials: GE potatoes caused immune systems of rats to respond more slowly; GE peas provoked inflammatory response in mice, suggesting that they might cause deadly allergic reactions in people. (Ibid)
- Bt toxins have killed many species of insect larvae. (Ibid)
- There have been reports of thousands of Indian farmers experiencing allergic reactions after picking Bt cotton. Thousands of sheep deaths have been reported in AP after the sheep grazed on Bt cotton. (http://www.gmwatch.org/latest-listing/1-news-items/10585-why-gm-crops-are-dangerous)
- A 2001 CDC study found 28 subjects had experienced apparent allergic reactions after ingesting GM corn. (CDC report to FDA. Investigation of human illness associated with potential exposure to Cry9c. June 11, 2001. Available at: *http://www.cdc.gov/nceh/ehhe/cry9creport/pdfs/cry9creport.pdf*).

4. The Myth of Substantial Equivalence

The safety debate has been repeatedly suppressed by bad science. One of the unscientific strategies used to extinguish the safety discussion is to tautologically define a novel organism or novel food created through genetic engineering as 'substantially equivalent' to conventional organisms and foods. However, genetically engineered crop or food is different because it has genes from unrelated organisms – it cannot, therefore, be treated as equivalent to a non-genetically engineered crop or food. In fact, the biotechnology industry itself gives up the claim of 'substantial equivalence' when it claims patents on GMOs on grounds of novelty.

While governments and government agencies promoting genetic engineering refer to 'sound science' as the basis for their decisions, they are manipulating scientific data and research to promote the interests of the biotechnology industry while putting citizen health and the environment at risk. The report by EPA scientists entitled "Genetic Gene: The premature commercial release of genetically engineered bacteria" and the report by Andrew Christiansen "Recombinant Bovine Growth Hormone: Alarming Tests, Unfounded Approval: The Story Behind the Rush to Bring rBGH to the market" show in detail how regulatory agencies have been manipulated on issues of safety.

Scientific agencies have been split and polarized into two communities – a corporate science community and a public science community. The corporate science community participates in distorting and manipulating science. Among the distortions of corporate science is the assumption of 'substantial equivalence' which is falsified both by the research done by the public science community as well as by the intellectual property rights claims of the biotechnology industry itself.

When industry wants to avoid risk assessment and issues of liability, the argument used is that the genetically engineered organism is 'substantially equivalent' to the non-engineered parent. However, when industry wants property rights, the same GMO becomes 'novel' or substantially inequivalent to the parent organism.

When a safety and intellectual property rights discourse of the genetic engineering industry is put side by side what emerges is an unscientific, incoherent undemocratic structure for total control through which absolute rights are claimed and all responsibility is denied and disclaimed.

This ontological schizophrenia is based on and leads to incoherence, which is a characteristic of bad science. Good science is based on coherency. The consistency and incoherence between the discourse on property rights and the discourse on issues of safety contributes to undemocratic structures in which there are no mechanisms to protect citizens from corporate irresponsibility.

A second unscientific concept used to ignore biosafety considerations is 'significance'. Thus the EPA has argued that because we are surrounded by bacteria, the risk of introducing pathogenic bacteria through gene transfer is not significant. The EPA has argued that because the problem of antibiotic resistance already exists, any new risk is insignificant. These unscientific attempts to ignore risks or suppress scientific data on risks are examples of bad science, not good science.

Another strategy used to suppress good science by bad science is in the design of trials, and the extrapolation of data from artificially constructed contexts to real ecosystems.
The final strategy used is of direct arm twisting, used by the US administration repeatedly to kill the Biosafety protocol in the Convention of Biological Diversity (CBD), even though

the US is not a party to the Convention. In spite of it, the countries of the world adopted the Cartagena Protocol on Biosafety in 2000. It was also the strategy used against labeling of genetically engineered foods. However, the world agreed to GMO labelling in the Codex Alimentarius.

While constantly referring to science the US government is in fact promoting bad science, and with it, promoting ecological and human health risks. Instead of generating scientific understanding of the impacts of transferring genes, it is promoting deliberate ignorance.

'Don't Look, Don't See' "The Strategy of Deliberate Ignorance"

The false assumption of 'substantial equivalence' of GMOs and non-engineered organisms establishes a strategy of deliberate ignorance. Ignorance of the risks is then treated as proof of safety. 'Don't look – don't see' leads to total lack of information about the ecological impacts of genetic engineering.

It is often claimed that there have been no adverse consequences from more than 500 field releases in the US. However, the term 'releases' is completely misleading. Those tests were largely not scientific tests of realistic ecological concerns, yet 'this sort of non-data on non-releases has been cited in policy circles as though 500 true releases have now informed scientists that there are no legitimate scientific concerns'.

Recently, for the first time, the data from the US Department of Agriculture field trials were evaluated to see whether they support the safety claims. The Union of Concerned Scientists (UCS) that conducted the evaluation found that the data collected by the USDA on small-scale tests have little value for commercial risk assessment. Many reports fail to even mention – much less measure – environmental risks. Of those reports that allude to environmental risk, most have only visually scanned field plots looking for stray plants or isolated test crops from relatives. The UCS concluded that the observations that 'nothing happened' in those hundreds of tests do not say much. In many cases, adverse impacts are subtle and would never be registered by scanning a field. In other cases, failure to observe evidence of the risk is due to the contained conditions of the tests. Many test crops are routinely isolated from wild relatives, a situation that guarantees no outcrossing. The UCS cautioned that "…care should be taken in citing the field test record as strong evidence for the safety of genetically engineered crops" (Jane Rissler & Margaret Mellon, The Ecological Risks of Engineered Crops, The MIT Press, 1996).

The myth of safety of genetic engineering is manufactured through deliberate ignorance. Deliberate ignorance of the impacts is not proof of safety; it is a guarantee for disaster.

The scientific corruption by the biotech industry and the sacrifice of knowledge sovereignty began in 1992 with the concoction of the false principle of substantial equivalence. The false assumption of 'susbtantial equivalence' was introduced by President George H.W. Bush in US policy immediately after the Earth Summit in Rio de Janeiro to blunt the call for biosafety regulation. It was later formalized and introduced in 1993 by OECD (UN Organization for Economic Cooperation and Development), and subsequently endorsed by FAO (UN Food and Agriculture Organization) and WHO (World Health Organization). The OECD document states -

"For foods and food components from organisms developed by the application of modern biotechnology, the most practical approach to the determination is to consider whether they are substantially equivalent to analogous food products if such exist. The concept of substantial equivalence embodies the idea that existing organisms used as foods, or a s a source of food, an be used as the basis for comparison when assessing the safety of human consumption of food or food component that has been modified or is new."

Apart from being vague, this definition is unsound. Foods with Bt toxin genes are not the same as foods without. Herbicide-resistant crops are different from existing varieties because they have new genes for resistance to herbicide. An article by Marc Lappe and others in the Journal of Medicinal Food (1999) has established that Monsanto's Round Up Ready soya beans change the levels of phytoestrogens by 12 to 14 percent. To treat these differences as insignificant when it is a question of safety, and as significant when it is a question of patentability, is totally unscientific. As Millstone, Brunner and Mayer have stated in "Beyond Substantial Equivalence' (Nature, 7 October, 1999):

"Substantial equivalence is a pseudo-scientific concept because it is a commercial and political judgment masquerading as if it were scientific. It is, moreover, inherently anti-scientific because it was created primarily to provide an excuse for not requiring biochemical or toxicological tests. It, therefore, serves to discourage and inhibit potentially information scientific research."

The scientifically false principle of substantial equivalence was put in place in U.S immediately after the Earth Summit to undo the articles on Biosafety in the Convention on Biological Diversity.

The false assumption of "substantial equivalence" of GMOs GE and non-engineered organisms establishes a strategy of deliberate ignorance. Since the transgenic is never assessed, ignorance of risks is then treated as proof of safety. "Don't look, don't see, don't find" leads to total lack of information about the ecological impacts of genetic engineering.

"Substantial equivalence" also contradicts the claim to novelty and invention through patents. Mahyco has a patent on Bt Brinjal. When industry wants to avoid risk assessment and issues of liability, the argument used is that the genetically engineered organism is "substantially equivalent to the non-engineered parent organism. However, when industry wants intellectual property rights and patents, the same GMO become "novel" or substantially in-equivalent to the parent organism". This is ontological schizophrenia.

Besides the impact on health, GMOs have severe ecological impact, the most significant being genetic contamination. The Canadian farmer Percy Schmeiser lost his canola seed due to contamination from neighboring GE crops.

5. Genetic Contamination is Inevitable, Co-existence is not possible

In addition to causing harm to public health and ecosystems, GE seeds and crops provide a pathway for corporations to "own" seeds through patents and intellectual property rights (IPRs). Patents provide royalties for the patent holder and corporate monopolies. This translates into super profits for Monsanto. For the farmers this means debt. For example, more than 250,000 Indian farmers have been pushed to suicide in the last decade and a half. Most of the suicides are in the cotton belt where Monsanto has established a seed monopoly through Bt cotton.

At a conference in Washington, D.C. on the Future of Farming, U.S. Secretary of Agriculture, Tom Vilsack, referring to organic farming and GMOs said, "I have two sons, I love them both and I want them to coexist." Filmmaker Debra Grazia responded from the floor "but one of your sons is a bully."

GMOs contaminate non-GE crops. Contamination is inevitable, since cross-pollination is inevitable, within the same species or with close relatives.

The most dramatic case of contamination and genetic pollution is the case of Percy Schmeiser, a Canadian Canola seed grower, whose crop was contaminated by Monsanto's Round-Up Ready Canola. Instead of paying Percy for the damage of contamination in accordance with the "Polluter Pays" principle, Monsanto sued Percy for "Intellectual Property theft."

The contamination of canola in Canada is so severe that 90 percent of certified non GE Canola seed samples contain GE material *(www.lynnmaclaren.org.au/media-release-major-grain-traders-reject-gm-canola)*.

As Arnold Taylor, Chair of the Organic Agriculture Protection Fund said: *"There is no organic canola in Canada any more, virtually none, because the seed stock is basically contaminated… we've lost that crop"* (GM Canola 'contaminated', Canadian Farms, The Age.com.au, July 5, 2011).

In the Agriculture Canada study, scientists in Saskatoon found that nearly half of the 70 certified seed samples tested were contaminated with the Roundup Ready gene. Thirty-seven percent had the Liberty Link gene and 59 percent had both.

Reuters, 19 Sept.2011
Super weeds pose growing threat to U.S. crops
Farmer Mark Nelson yanks a four-foot-tall weed from his Kansas soybean field. The "waterhemp" towers above his beans, sucking up the soil moisture and nutrients his beans need to grow... "When we harvest this field, these waterhemp seeds will spread all over kingdom come" he said. An estimated 11 million acres are infested with "super weeds" some of which grow several inches in a day and defy even multiple dousings of the world's top-selling herbicide, Roundup, whose active ingredient is glyphosate.

Canadian researchers tested 33 samples of certified non-GE canola seed and found 32 samples contaminated with GE varieties – with three samples having contamination levels of more than two percent (Freisa L, Nelson, A & Van Acker, R, (2003) Evidence of contamination of pedigreed canola (brassica napus) seed lots in western Canada with genetically engineered herbicide resistance traits." Agronomy Journal, 95, 2003, pg. 1342 – 1347).

Another study in the US found that virtually all samples of non-GE corn, soy beans, and canola seed were contaminated by GE varieties (Mella M and Rissler J (2004), Gone to Seed: Transgenic Contaminates in the Traditional Seed Supply, Union of Concerned Scientists).

A study in the UK found that GE canola cross-pollinated with non-GE canola more than 26 km away (Ramsay G, Thompson C and Squire G, (2004). Quantifying landscape-scale gene flow in oil seed rape, Scottish Crop Research Institute and U.K Department of Environment, Food and Rural Affairs, (DEFRA), October 2004, p.4, *http://www.scri.ac.uk/scri/file/EPI/Agroecology/Landscape_scale_geneflow_in_oilseed_rape.pdf*).

An Australian study found that gene-carrying pollen from GE canola can travel up to three km via wind or insects. The present isolation distance in Canada between GE and non-GE canola is a mere 100 metres. (Studies show gene flow in GE canola likely widespread, by Ron Friesen, July 4, 2002, *http://monsanto.unveiled.info/canada/geneflow.htm)*.

The Canadian National Farmers Union (2005) stated "GE crop agriculture is incompatible with other forms of farming – non-GE and organic, for instance, because GE crops contaminate and because segregation is impossible (*http://www.non-gm-farmers.com/documents-GM-canola*).

A report of the Japanese Institute for Environmental Studies (JIES) confirmed that herbicide resistant genetically engineered canola plants had escaped into Japanese ecosystems at major shipping ports along the Japanese coast (*http://www.greenpeace.org/international/en/publications/reports/canola-report/*).

In a 2007 report by the Network of Concerned Farmers on "The Economies of genetically modified canola" it was assessed that if GM canola was introduced in Australia and 20 percent of farmers adopted it, non-GE farmers would suffer losses of $65.52 million due to contamination.

In December 2010, organic farmer Steve Marsh in Australia lost his organic status because his harvest was found contaminated with genetically modified Roundup Ready canola (*http://www.perthnow.com.au/news/special-features/gm-contamination-of-organic-crop-confirmed/*).

In August 2006, trace amounts of Bayer's experimental genetically engineered Liberty Link rice was found to have contaminated 30 percent of the Riceland in Texas, Louisiana, Missouri, Arkansas and Mississippi. The trials for the GE rice were being undertaken by Bayer and Louisiana State University at Crowley, LA. Within four days, the news of contamination led to decline in futures prices by 14 percent, costing growers $150 million. Exports fell as the European Union, Japan and Russia stopped importing long grain rice grown in the US. Eleven thousand US rice farmers sued Bayer for contaminating their rice and ruining their exports. On July 1, 2011, Bayer agreed to pay the farmers $750 million to settle (Bayer settles with farmers over modified rice seeds, New York Times, 2nd July, 2011 – *http://www.nytimes.com/2011/07/02/business/02rice.html*).

In 2001, D. Quist and I. Chapela of the University of Mexico published a study in Nature magazine "Transgenic DNA introgressed into traditional maize land races in Oaxaca, Mexico (nature, 414, 6863, November 29, 2001 p. 541-543). Their study showed that native maize had been contaminated by GE corn. This was in spite of the fact that it is illegal to grow GE maize in Mexico.

Mexico is the center of diversity of corn. This is where corn was domesticated and where the highest diversity of corn exists. According to the government, the contamination took place when farmers planted corn imported from the US, not knowing it was genetically modified.

In April 2002, the Mexican government confirmed contamination of native corn by GE corn. As Jorge Soberon, Secretary of Mexico's Biodiversity Commission, stated "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" (C. Clover, "Worst ever GM crop Invasion, The Daily Telegraph, London, April 19, 2002, P. Brown, Mexico's Vital Gene Reservoir Polluted by Modified Maize, Guardian, London, April 19, 2002).

In 2003, native corn in Mexico was found contaminated by genetically modified varieties in corn fields in the states of Chihueha, Morelos, Durango, Mexico State, Puebla, Oaxace, San Luis Potosi, Tlaxcale and Veracruz. The analysis was carried out by a coalition of farmer's organizations. The contamination was a high as 33 percent in some samples.

The contamination of corn in Mexico is not just a biological phenomenon. It has cultural implications. As Aldo Gonzalez, a farmer from Sierra Juarez de Oaxaca stated, "The contamination of our traditional maize undermines the fundamental autonomy of our indigenous and farming communities because we are not merely talking about our food supply; maize is a vital part of our cultural heritage. (ETC, Genetic Pollution in Mexico's Center of Maize Diversity, Food First Backgrounder, Spring 2002, Vol. 8, No.2).

In 2000, Starlink Corn, a Bt crop patented by Aventis (newly acquired by Bayer) which had not been approved for human consumption, was found in supermarket products in the US when a coalition of environmental groups commissioned a testing of corn products. More than 70 types of corn chips and more than 80 types of taco shells had to be recalled, leading to major disruptions in US and international markets.

The peaceful coexistence of GMOs and conventional crops is a myth: environmental contamination via cross-pollination, which poses a serious threat to biodiversity, is unavoidable.

- GM GE pollen can potentially cross-pollinate with both non-GM GE crops and weeds, potentially creating pest-resistant super weeds. Insects and wind can carry pollen over kilometers, and the situation is further complicated by the fact that seeds can stay in the soil for years before germinating. Moreover, there is no sure way to prevent human error or illegal planting of GM GE seeds. (GM Contaminations Briefing" Friends of the Earth, January 2006. *http://www.foe.co.uk/resource/briefing_notes/gene_escape.pdf*)

  Separating fields of GM GE and non-GM GE seeds is not a sufficient precaution: low levels of pollution can be found as far as several hundred meters away, and it' is difficult to draw the line at which contamination can be prevented. An Australian study in 2002 found GM GE genes as far as 3 km from the source. Moreover, there was no obvious gradient of contamination corresponding to distance from the source: contamination is unpredictable. (Crop Pollen Spreads Further than Expected." NewScientist. June 27 2002. *http://www.newscientist.com/article/dn2471*).
  Wind and insects have been documented as carrying pollen over more than 20 km. (GM Contaminations Briefing." Friends of the Earth. January, 2006. *http://www.foe.co.uk/resource/briefing_notes/gene_escape.pdf*) Even with separation, contamination is really beyond human control: In March 2011, farmers found their canola fields contaminated by GE seed washed there by floods.
- In May 2011, a report found GE seedlings in three traditional maize fields in Uruguay. ("GM Maize contaminates non-GM crops in Uruguay." Daniela Hirschfeld. Scidev.net. May 9 2011. *http://www.gmwatch.eu/latest-listing/1-news-items/13132-gm-maize-contaminates-non-gm-crops-in-uruguay*)
- In Canada, there have been numerous reports of GM canola sprouting up where it wasn't planted, and tests found GM genes in more than 50 percent of canola plants. (Studies show gene flow in GM canola likely widespread." Ron Friesen. Manitoba Co-operator, July 4 2002. *http://monsanto.unveiled.info/canada/geneflow.htm*). Similar reports from Japan, the US, and Australia. (Special Report: Genetically Modified Canola Contamination in Japan." Nishoren.org, October 29 2010. *http://www.nishoren.org/en/?p=888)*
- In the US, an estimated 50 percent of maize seeds, 50 percent of cotton seeds, and 80 percent of canola seeds now contain GE DNA, according to a study by the Union of Concernced Scientists. ("The Day the Sun Dies: Contamination and Resistance in Mexico" Silvia Reibeiro. GRAIN.org, July 2004. *http://www.grain.org/seedling/?id=292#_3*)
- In Hawaii, 30-50 percent of papaya was found to be contaminated with GM genes. ("Hawaiian Papaya: GMO Contaminated" Hawaii SEED, 2006. *http://www.grain.org/research_files/ Contamination_Papaya.pdf*)
- In 2004, GE papaya field trials in Thailand were found to be the source of widespread genetic contamination; more was found in 2005 after the Department of Agriculture claimed it had all been eradicated. (*http://www.greenpeace.org/international/en/news/features/ge-papaya-010606/*)
- In 2005, 13,500 tons of maize in New Zealand

were found to be contaminated by GE material during routine testing—the sixth such incident in three years. (*http://www.connectotel.com/gmfood/nz270705.txt*)
- In Japan in 2005, GE crops (corn, soya) were found growing all over ports as a result of seeds being spilled during unloading and transportation. (*http://www.lifeissues.net/writers/mcc/mcc_01 geneticengin.html*).
- A 2004 report found widespread contamination of soya in Brazil. (*http://www.grain.org/research/contamination.cfm?id=164*).

6. Patents on Seeds and Seed Monopolies

GMOs are intimately linked to seed patents. In fact, patenting of seeds is the real reason why industry is promoting GMOs.

Monopolies over seeds are being established through patents, mergers and cross licensing arrangement.

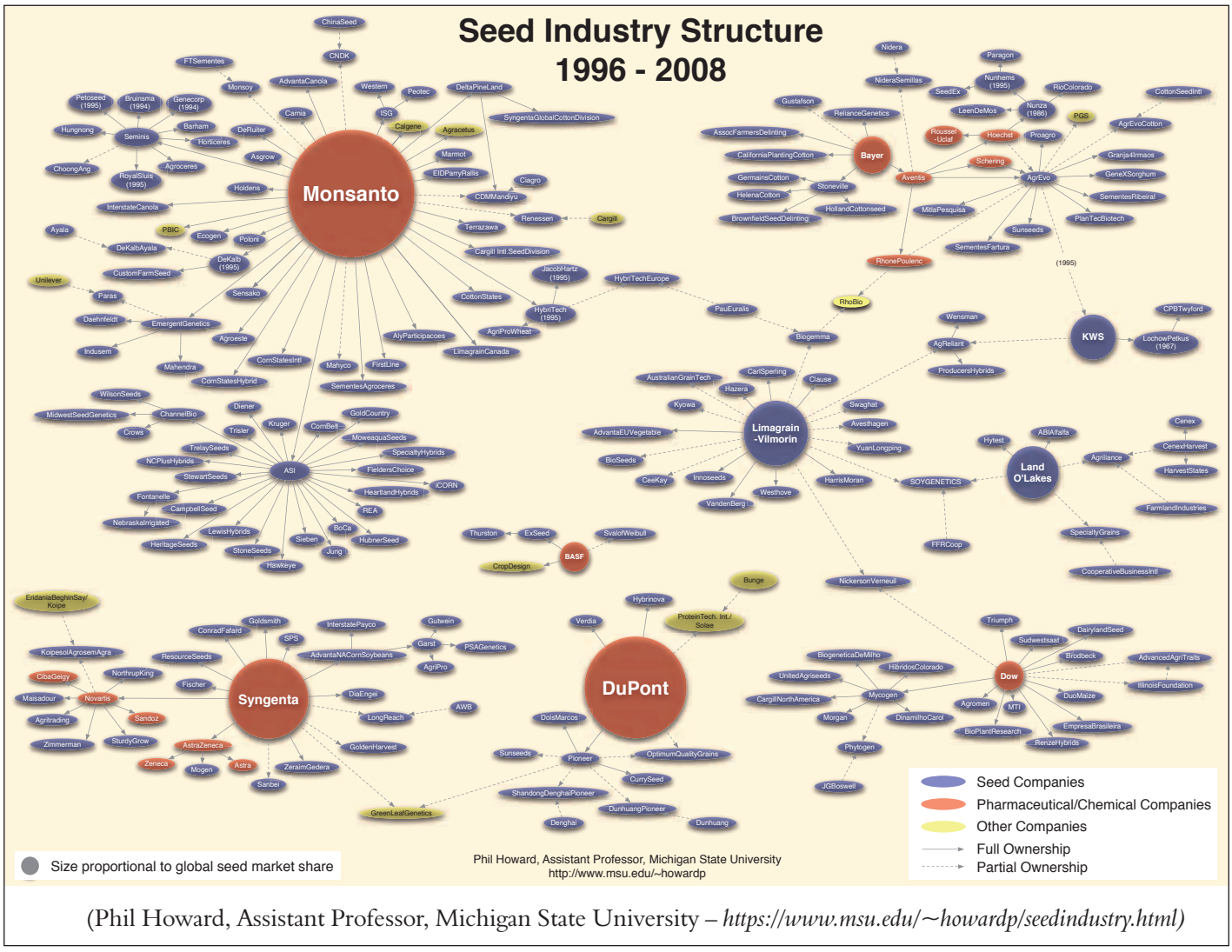
Monsanto now controls the world's biggest seed company, Seminis, which has bought up Peto Seed, Bruinismo, Genecorp, Barhan, Horticere, Agroceres, Royal Suis, Choon Ang, Hungnong. Other seed acquisitions and joint ventures of Monsanto are – Asgrow, De Rinter, Monsoy, FT Sementes, Carma, Advanta Canola, China Seed, CNDK, ISG, Wertern, Protec, Calgene, Deltapine Land, Syngenta Global Cotton Division, Agracetus, Marneot, EID Parry Rallis, CDM Mandiyu, Ciagro, Renessan, Cargill, Terrazawa, Cargill International Seed Division, Hybritech, Jacob Hartz 1995, Agriprowheat, Cotton States, Limagrain Canada, Alypanticipacoes, First line, Mahyco, Corn States Intl, Corn States Hybrid, Agroeste, Seusako, Emergent Genetics, Mahendra, Indusem, Darhnfeldt, Paras, Unilever, Dekelb, Lustum, Farm Seed, Deklbayala, Ayala, Polon, Ecogen, PBIC.

Monsanto has cross-licensing arrangements with BASF, Bayer, Dupont, Sygenta and Dow. They have agreements to share patented genetically engineered seed traits with each other. The giant seed corporations are not competing with each other. They are competing with peasants and farmers over the control of the seed supply.

World's Top Ten Seed Companies

S.No.	Company	2007 Seed Sales (US $ Million)	% of global Propriety seed market
1	Monsanto (US)	$ 4694	23%
2	Dupont (US)	$ 3300	15%
3	Sygenta (Switzerland)	$ 2018	9%
4	Groupe Linagrain (France)	$ 1226	6%
5	Land Olakes (US)	$ 917	4%
6	KWS AG (Germany)	$ 702	3%
7	Bayer Crop (Germany)	$ 524	2%
8	Sahata (Japan)	$ 396	< 2%
9	DLF Trifolum (Denmark)	$ 391	< 2%
10	Takii (Japan)	$ 347	< 2%
	Top 10 Total	$ 14785	67%

(ETC: Who owns Nature http://www.etcgroup.org/upload/publication/707/01/etc_won_report_final_color.pdf).



(Phil Howard, Assistant Professor, Michigan State University – *https://www.msu.edu/~howardp/seedindustry.html)*

The combination of patents, genetic contamination and the spread of monocultures means that society is rapidly losing its seed freedom and food freedom. Farmers are losing their freedom to have seed and grow organic food free of the threat of contamination by GE crops. Citizens are losing their freedom to know what they are eating, and the choice of whether or not to eat GE free food.

An example of seed monopolies is cotton in India. In a decade, Monsanto gained control of 95 percent of the cotton seed market, and seed prices jumped 8,000 percent. India's Anti-Trust Court, the Monopoly and Restrictive Trade Practices Commission, was forced to rule against Monsanto. High costs of seed and chemicals have pushed 250,000 farmers to suicide with most suicides concentrated in the cotton belt. Monsanto does not just control the seed through patents. It also spreads its control through contamination. After spreading genetic contamination, Monsanto sues farmers as "intellectual property thieves" as it did in the case of Percy Schmeiser. That is why a case has been brought against Monsanto by a coalition of more than 80 groups to stop Monsanto from suing farmers after polluting their crops. (*http://www.pubpat.org/assets/files/seed/OSGATA-v-Monsanto-Complaint.pdf)*

Denial of labeling as the denial to consumers of their democratic "Right to Know" and "Right to Choose"

In June 1997, the US Trade Representative Charlene Barshefshy warned the European Union Agriculture Commission Franz Fischler not to go through with proposals to require the labeling of genetically modified organisms (GMOs) or their segregation from regular products. The Trade Representative told the Senate Agriculture Committee that the US cannot tolerate a step which would cause a major disruption in U.S exports to the E.U.

The E.U. Commissioner was under pressure from European Consumers to label GMO foods

as their democratic right to information and choice. However, consumer rights were defined by the US trade representative as "arbitrary, politicized and scientifically unjustified" rules. The insistence of consumers to pursue "non-science based restrictions" would lead to a "trade war of major dimensions."

In a letter to the US Secretary on June 12th, 1997, US agribusiness corporations stated the segregation of crops for labeling is both scientifically unjustified and commercially unfeasible.

According to US industry, labeling of foods violates the WTO agreement on free trade. The Sanitary and Phyto-Sanitary measures in WTO are thus viewed by industry as protecting their interests. But the right to information is about democracy and democratic rights cannot be sanctioned by arbitrary technocratic and corporate decision making about what is 'sound science' and what is not.

The denial of labelling is one dimension of totalitarian structures associated with the introduction of genetic engineering in food and agriculture. Navdanya filed a case in India demanding labeling of GM foods but the direct intervention by the US embassy prevented the labeling law from being introduced by the Indian Health Ministry.

On July 5, 2011 Codex Alimentarius, the international food safety body, recognized the right of countries to label GMO foods. This ended twenty years of an international struggle. As the Consumer International states: "The new Codex agreement means that any country wishing to adopt GM food labeling will no longer face the threat of a legal challenge from the World Trade Organization (WTO). This is because national measures based on Codex guidance or standards cannot be challenged as a barrier to trade."(*http://foodfreedom.wordpress.com/2011/07/05/codex-alimentarius-adopts-labeling-of-genetically-modified-foods/*).

We now need to build on this right-to–know principle and ensure GMO labeling in all countries.

GMOs are an Issue of Food Democracy

This is why GE crops are an issue for democracy. Food democracy is everyone's right and responsibility. We have food democracy when we can exercise our choice to have GMO free seed and food. This choice is being undermined as seed is genetically engineered and patented, as food systems are increasingly controlled by giant corporations, as chemical pollution and genetic pollution spread uncontrolled, making our food unsafe. Each of us must defend our food freedom and urge our governments to protect the rights of their citizens and stop supporting corporate takeover of our seeds and foods. Each of us is vital in creating food democracy. We invite you to join us to defend the most fundamental freedom: our food freedom.

⋆ *Vandana Shiva, distinguished Indian physicist environmentalist, and campaigner for sustainabilitiy and social justice. Director/Founder of The Research Foundation for Science, Technology and Ecology (RFSTE) and Director/Founder of Navdanya. She is the author of numerous books and the recipient of a number of awards, including the Right Livelihood Award and most recently the Sydney Peace Prize.*

II. SYNTHESIS

Debbie Barker*

As the instructive tale of *The Emperor's New Clothes* makes clear, one lone voice speaking the truth can lift the shroud covering untruths and complicity.

This report is a compilation of the many voices from around the globe speaking the truth about what is happening in their communities and countries and are exposing the fable that genetically modified organisms (GMOs) are, as Wendell Berry writes, "the latest answer-to-everything."

GMO advocates claim that biotechnology can ameliorate major challenges of our day, notably food crises, natural resource degradation, and climate chaos associated with global warming. However, as these reports reveal, GMOs have failed to live up to the cure-all claims, and moreover this technology is a continuation of a global industrial agricultural model that has failed to feed the hungry and has contributed to environmental destruction and global warming.

Genetically Modified (GM) — The Way to Food Security?

Genetically modified (GM) seeds and plants have been around almost two decades, yet in this time hunger has reached epic numbers, with more than one billion people going hungry every day. GM advocates often argue that people are going hungry because they will not eat GM food due to scare-mongering tactics of those who campaign for a cautionary approach. "Food insecurity in developing regions such as Africa is partially a result of the anti-GM campaign," said David King, director of the Smith School of Enterprise and the Environment at Oxford University in Britain, during the 15th World Congress of Food Science and Technology.[1]

This people-just-don't-know-what's-good-for-them platitude belies a few important facts. First, the claim that GM crops produce higher yields and therefore will feed the hungry is false. This is well documented by empirical experiences and scientific studies cited in this report. Alongside the yield falsehood, attempts to cultivate GM crops of cassava, yam, and other food staples have failed.

For example, in early 2000 Monsanto-trained scientist, Florence Wambugu, directed a project to create a GM virus-resistant sweet potato to be grown in Kenya. Wambugu traveled the world extolling the virtues of GM crops and the media reported widely about great success of the GM sweet potato even before it was field tested. Forbes magazine reported, "While the West debates the ethics of genetically modified food, Florence Wambugu is using it to feed her country."

While headlines and opinion leaders declared the GM sweet potato to be a triumph, the results of the field trials were quietly published in 2004. Kenya's Daily Nation reported: "Trials to develop a virus resistant sweet potato through biotechnology have failed." Yet, the lore of the GM sweet potato is still repeated as an example of how millions in Africa can be spared from hunger.

[1] http://ipsnews.net/africa/nota.asp?idnews=52641

A second reason why GM crops are not feeding the hungry is because they are feeding animals and cars instead. The overwhelming majority of GM crops are grown for either animal feed or to produce biofuels. In large part, this is because enormous profits can be made from crops that feed into an industrialized model of agriculture. Small-scale, agroecological farm systems that grow food locally for local consumption are systems of self-sufficiency and do not fit into an industrial, market-based paradigm.

Third, GM crops are an extension of the current industrial model that fails to recognize that hunger is fundamentally a problem of poverty, food distribution, and inequity. Even though we currently grow enough food to feed the world, more than one billion people still go hungry. Enough food is available to provide at least 4.3 pounds of food per person per day worldwide: this consists of two and a half pounds of grain, beans, and nuts, about a pound of fruits and vegetables, and nearly another pound of meat, milk, and eggs.[2]

Food security begins with equitable and fair access to land and vital natural resources. The current system of relying on global markets and import/export models has dismantled food security at the household level where it must begin. Agroecological systems provide the multi-functionality and self-reliance that will ensure plentiful and equal access to food and water.

Fourth, proponents of GM seeds and crops either do not realize—or do not acknowledge—that, in contrast to the high-tech, very costly GMO industrial system, there are viable, low-cost farming methods that better guard against hunger and poverty. Vigorous research demonstrates that agroecological, organic methods of farming can produce yields equal to or greater than industrial agriculture yields. "Model estimates indicate that organic methods could produce enough food on a global per capita basis to sustain the current human population, and potentially an even larger population without increasing the agricultural land base," states a report based on a long-term, comprehensive global research project.[3] Based on 293 test cases, the research found that, in developing countries, organic methods produced 80 percent higher yields than industrial farms.[4]

A recent study by the United Nations Special Rapporteur on the Right to Food reported that agroecological systems doubled crop yields over a period of three to 10 years in field tests conducted in 20 African countries.[5] The report also cites numerous other studies confirming high yields and reduced chemical use in other regions of the world due to agroecological farming methods.

Common Threads, Common Visions

Countries and regions discussed in this report each have distinct experiences with GMOs, however, there is a common thread to all of the stories. The main theme is that even though citizens in every country, in poll after poll, clearly express that they do not want GMO products, most government leaders insist on supporting this technology and even work to hasten adoption of GM seeds and crops.

Why are so many governments working to contravene the desires of their citizens? The collusion between governments and biotechnology corporations is manifested through various tactics. Lobbying, marketing, funding science, education, and research institutions, "revolving door" political influence, and blatant disregard for the law are all exposed in these reports. These reports illuminate the omnipresence of the industry.

As noted in the report from the U.S., the leading proponent of GM crops—top food and agricultural biotechnology firms spent more than $547 million lobbying Congress between 1999 and 2009. In addition to lobbying efforts, the biotechnology industry has made more than $22 million in political campaign contributions since 1999.[6]

Additionally, there is a "revolving door" spinning out of control as many former employees of the biotechnology industry are now working

[2] Holly Poole-kavana, 12 Myths About Hunger, backgrounder, 12 (2), oakland: Food First, 2006, http://www.foodfirst.org/sites/www.foodfirst.org/files/pdf/Bg%20SU06%2012%20Myths%20 About%20Hunger.pdf.
[3] Catherine Badgley et al., Organic Agriculture and the Global Food Supply, Cambridge Journals, 9 June 2006, Introduction, doi:10.1017/S1742170507001640.
[4] Ibid.
[5] Olivier De Schutter, Food Commodities Speculation and Food Price Crises, issue brief, Geneva, Switzerland: United Nations, 2010, p. 1-2, http://www.srfood.org/images/stories/pdf/otherdocuments/20102309_briefing_note_02_en.pdf (accessed 18 January 2011).
[6] http://documents.foodandwaterwatch.org/BiotechLobbying-web.pdf

in government posts, or have become official advisors to governments. The regulated are becoming the regulators with predictable results—policies to safeguard the public are being eliminated or ignored. The reports provide numerous illustrations of this revolving door influence.

For example, in Argentina, representatives from biotechnology corporations Monsanto, Syngenta, Bayer, Dow, and Pioneer sit on a prominent national panel that directly advises the government agency that decides about the release applications that these same companies submit.

In the U.S., it is now standard practice for biotechnology firms to employ former members of Congress and Congressional and White House staff to give the industry an inside track. There are many examples of former employees from biotechnology corporations now working in government—a senior advisor to the Food and Drug Administration (FDA) was a former lobbyist for Monsanto, the head of the main research arm for U.S. government agricultural research formerly worked for Danforth Plant Science Center (funded by Monsanto), and a former Monsanto employee is on the government committee tasked with legalizing GM salmon.

Another main reason why many governments are opening the doors to GMOs is because of the far-reaching marketing and advertising influence of the industry.

Just as the weavers in the *Emperor* tale repeatedly assured everyone that they were indeed weaving beautiful garments, biotechnology corporations repeat stories of success over and over again until the message becomes the truth instead of actual experiences and outcomes.

The recent "America's Farmers Grow America" advertising campaign in the U.S. depicts Monsanto as being a friend to farmers and helping to grow the U.S. economy. "We are going to help tell their story. And it's a great story to tell," Monsanto says. But the hundreds of farmers being sued by Monsanto for alleged patent infringement and violation of technology user agreements might have a different story to tell.

In India, Monsanto's advertising slogan is: "India delights as cotton farmers' lives transform for the better." But the widows of the more than 250,000 farmer suicides in India related to GM cotton crop failures are certainly not delighting.

Marketing influences also include more subtle methods that include dispatching industry representatives to speak at everything from book fairs to private investor gatherings to a host of conferences for "future leaders," "innovators of tomorrow." An example from Australia details marketing that goes far beyond subtle. In response to a moratoria on the sale of GM seed by some state governments, the industry quickly countered and developed a touring workshop geared for corporate executives entitled, "How to Beat Activists at Their Own Game." At one of the workshops, a speaker advised participants to "Take the moral high ground. …Tell politicians that when they support biotechnology they are demonstrating much needed moral and political leadership. Conversely, you may want to point out the immorality of those who oppose biotechnology."

Contamination/Illegal Plantings

As many of country reports note, GM seeds and crops frequently enter into regions via illegal plantings. In many instances, the biotechnology industry has simply ignored laws that prohibit GMOs, or GM seeds and plants are distributed to farmers via underground markets. Contamination is another vehicle for spreading GMOs. The similar experience in many countries is that once GMOs are found in a country—whether via contamination or illegal plantings—governments often use this to justify legalizing GM seeds and crops.

In the report on India, Dr. Vandana Shiva sums up the experience of India that is repeated in country after country. "Either Monsanto blatantly violates the laws, or it has laws changed through its influence. It changes policies to privatise the seed and make farmers dependent on its seed monopoly. It corrupts governments and policymakers. It corrupts knowledge and science. It corrupts biodiversity through genetic contamination and genetic pollution."

Crop Failures/Effects on Farmers

Another common refrain throughout the reports is that governments and industry promise farmers higher profits if they convert to GM seeds and crops, yet farmers are left on their own when failures come.

This is the situation of Bt cotton's introduction in South Africa's Makhatini Flats. After five years, the majority of farmers growing Bt cotton are in debt and the number of farmers still growing the GM cotton has reduced by 80 percent.

Similarly, Conalgodón, the Colombian federation

of the cotton growers, has been seeking damages from Monsanto for cotton seed that failed to resist a plague to cotton plants as promised. Despite Monsanto assurances to farmers that they would be compensated for any potential losses when they approached farmers to switch to the GM cotton seed, Monsanto has still not provided damage payments.[7]

In the India report, the full story of farmer suicides related to the adoption of Bt cotton is told. Though the biotechnology industry has denied any correlation between the suicides and the introduction of GM cotton, this report documents that the suicides take on an epidemic proportion precisely when Monsanto began its illegal trials of the cotton and continue as Bt cotton is commercialized.

Environmental Consequence — More Pesticides, Emerging Super Weeds and Super Insects

Countries that have widely adopted GM technology are united in their reports of environmental harms caused by GM crops.

The U.S. Department of Agriculture (USDA) data, found that GM crops in the U.S. used more than 26 percent more pesticides per acre than non-GM, conventional crops.[8] In Argentina, the use of agrochemicals increased from 30 to 270 million liters between 1996 and 2007. Herbicide imports increased 330 percent with the introduction of GM soy. As compared to use on traditional fields, 9.1 million kilograms more of herbicides were used in GM soy plantations in 2001 alone.

Agronomists around the world are alarmed by the growing epidemic of herbicide-resistant weeds, also known as superweeds, that have evolved resistance to glyphosate as a result of the intensive use of this herbicide.[9] From November 2007 to January 2011, the number of reports of confirmed glyphosate-resistant weeds in the U.S. nearly doubled from 34 to 66. Infested acreage more than quintupled, from 2.4 to 12.6 million acres. (According to aggregated data from the USDA).

In Brazil, researchers have reported that some weeds have developed tolerance to glyphosate in nine species, four of which are weeds that can cause serious problems to crops[10,11].

As superweeds continue to spread, Btresistant super insects are emerging. Rootworms are developing a resistance to Monsanto's Bt corn in Iowa and Illinois. And, Monsanto has finally acknowledged that a bollworm pest has developed resistance to its Bt cotton in India.

The monoculture practice of GM farming is contributing to loss of biodiversity, global warming, and loss of tribal and indigenous lands. For example, each year, more than 200,000 hectares of native forests in Argentina are deforested as a result of the expansion of the agricultural frontier, mainly the expansion of soy monoculture plantations.

Trade/Policy Influence

Critiques or analyses of food systems sometimes do not fully incorporate the broad impacts of trade and economic policies and agreements.

For example, during negotiations for the Russian Federation's accession to the World Trade Organization (WTO), multinational biotechnology firms, along with the U.S. government, lobbied Russian officials to accept a special agreement on biotechnology that would eliminate the country's current GMO labeling laws and extend special allowances to U.S. biotechnology firms for their intellectual property rights pertaining to GM seeds and crops.

Prior to enacting economic reforms to comply with WTO rules (e.g., lifting "barriers" to allow investments by foreign firms), public sector breeding dominated the cotton seed market in India. Today, the bulk of value is now accounted for by private seed firms. India is the second largest producer of cotton, one of the world's most widely traded commodities. Yet—due

[7] (http://colombiareports.com/colombia-news/economy/4472-colombian-cotton-growers-want-to-sue-monsanto.html).
[8] Dr. Charles Benbrook, Impacts of Genetically Engineered Crops on Pesticide Use in the United States: The First Thirteen Years," The Organic Center, Nov. 2009, p. 47 & Supplemental Table 7, http://www.organic-center.org/science.pest.php?action=view&report_id=159.
[9] S.B. Powles (2010). "Gene amplification delivers glyphosate-resistant weed evolution," Proceedings of the National Academy of Science 107: 955-56.
[10] Review of potential environmental impacts of transgenic glyphosate-resistant soybean in Brazil. Cerdeira et al, 2007, available at: http://www.informaworld.com/smpp/content~content=a779480992.
[11] Buva "transgênica" resiste ao glifosato. Gazeta do Povo, December 1st, 2009.
http://portal.rpc.com.br/jm/online/conteudo.phtml?tl%3D1%26id%3D950000%26tit%3DBuva-transgenica-resiste-ao-glifosato.

to trade barriers being lifted — between 1997 and 98 and 2004 and 2005, India imported 115 lakh bales, more than three times the amount imported in the preceding 25 years.

Discrediting Scientists Opposing GMOs

Another repeated story told in these reports is one of scientists being discredited, and in some cases, dismissed from their jobs, when they speak out about GMOs. Often when these scientists begin GM-related research, they are not opposed to the technology. But their findings reveal reasons to be concerned about the impact of GMOs on food safety, public health, and the environment.

Dr. Arpad Pusztai, a world renowned scientist, was one of the first victims of a smear campaign that eventually resulted in him being forced to leave his post as director of the Rowett Research Institute. In 1997, Dr. Pusztai and his wife and colleague, Dr. Susan Bardocz, carried out the first nutrition and toxicological study on GMOs. When he fed GM potatoes to lab rats, he found that the organs of the rats became critically damaged and their immune systems were severely weakened. Days after an interview with the BBC News in which he discussed his findings his laboratory notes were confiscated and he was dismissed from his post. Dr. Pusztai revealed that the emperor had no clothes, but many were not ready to hear this news.

Similarly, Andrés Carrasco, a very well-known and respected professor of embryology at the Medicine School in the Buenos Aires University, undertook research that showed a lethal effect of glyphosate on amphibian embryos. Carrasco was met with a flurry of accusations by agribusiness, politicians, some media, and others that his findings were flawed. However, in this case a happier ending ensued. After careful review of his science, some provincial laws were enacted to regulate the use of glyphosate.

But, the usual response to science that contradicts safety claims of the biotech industry is retaliatory. Often corporations providing research funds for universities and institutes threaten to withdraw funds if any research on GMOs counters their claims of high yields, reduced pesticide usage, product safety, or other claims. Such threats obviously serve as a "chilling effect" and can limit the scope of science and research.

Warnings From Scientists

Many emerging scientific studies are demonstrating that GM technology can cause potential serious harms to human health and food safety, the environment, biodiversity of both plants and living creatures. This publication contains reports from scientists who are sounding the alarm on these troubling aspects of GMOs.

David Suzuki, a geneticist by training, reminds us that throughout history technologies have been too frequently advanced without full review. As one example, in Nazi Germany, geneticist Josef Mengele held peer-reviewed research grants for his work at Auschwitz. Suzuki empasizes that societies should apply the Precautionary Principle with any new technology and ask whether it is needed and then demand proof that it is not harmful. Nowhere is this more important than in biotechnology because it enables us to tamper with the very blueprint of life.

GMOs have been released without a complete assessment of their effect on public health and the environment. And, as learned from past experiences, anyone entering an experiment should give informed consent. Suzuki concludes, "That means at the very least food should be labeled if it contains GMOs so we each can make that choice".

Scientist Mae Won Ho reports that researchers at Bristol University have discovered a new phenomenon of horizontal gene transfer. That is, the spread of GM genes by infection and multiplication (via a virus) regardless of species barriers is occuring at a rapid pace.

"New combinations of genetic material are created at unprecedented speed, affecting species the most that reproduce the fastest," she reports. Won Ho provides great technical expertise and scientific information detailing this frightening scenario. Emphasizing that this could be the most serious hidden and underestimated hazard of GMOs, she calls for a global ban on further environmental releases of GMOs.

Hans Herren outlines how the 60-year history of industrial agriculture's toxic treadmill of using ever more potent chemicals has damaged soils, watersheds, biodiversity, as well as farmer livelihoods. Herren stresses that this damaging legacy should serve as a lesson and provide impetus for transitioning to farming without chemicals. However, instead societies are increasingly repeating past mistakes by turning to GM seeds and plants. As weeds and pests are increasingly building up resistance to the chemicals used on GM plants, the use of pesticides has increased greatly. Herren also notes

that GM plants have failed to deliver increased yields and have been unsuccessful in delivering any "climate ready" traits. He advocates for farming practices that build healthy soils which, in turn, require less water and use less energy than than industrial, chemical-ridden soils.

Bill Freese discusses how the use of glyphosate for weed control is largely responsible for a ten-fold increase in agricultural use of the herbicide in the U.S. from 1993 to 2007.[12] At 200 million pounds per year in the U.S. alone (2007),[13] glyphosate is the most heavily used pesticide the world has ever seen. Freese points out that glyphosate formulations are clearly harmful to the environment and may pose human health risks as well. He cites epidemiological studies of farmers that have shown an association between contact with glyphosate herbicides and higher rates of certain cancers – non-Hodgkin's lymphoma, hairy cell leukemia[14] and multiple myeloma.[15] He also explores increasing contamination of GM crops to non-GM crops and has also generated an epidemic of glyphosate-resistant weeds.

Former Managing Director of Monsanto, India, Dr. T.V. Jagadisan, writes of Monsanto's cloak and dagger business dealings in India and of the company's aim to control India's agriculture by controlling the country's seed business through its wholly-owned Indian subsidiary Mahyco. He points out that many more long term trials need to be carried out by independent agencies and cautions against the scientific community rushing into GM technology under the false claim of increasing production without understanding the true consequences.

In the section on the History of Monsanto, dintinguished Indian scientist, architect of molecular biology and biotechnology in India, Dr. P. M. Bhargava, gives a detailed account of Monsanto's violations, including fraud, false reporting, harassment and intimidation, bribing officials and in one extreme case withholding of evidence about the safety of their PCBs to residents which resulted in a court finding Monsanto guilty on six counts of negligence, wantoness and suppression of the truth, nuisance, trespass and outrage.

In addition to articles by these well regarded scientists, many country-specific reports provide information on GMO scientific research demonstrating many potential harms to humans and nature from this technology.

Movements and Resistance

As these reports show, civil society movements within countries and working in global solidarity continue to expose the falsehoods of GM technology. Civil society—including farmer, environmental, consumer, unions, public health and social justice groups—actions range from direct actions such as uprooting GM crops to policy and public outreach projects such as GMO-Freeze campaigns and GMO labeling initiatives. In addition, many regional governments also initiate actions and policies to halt GMOs. Networks of scientists—notably the European Network of European Scientists for Social and Environmental Responsibility, along with the Union of Concerned Scientists (U.S. based)—provide critical technical information for civil society and governments alike.

Some groups are undertaking legal actions. A few examples include: Biowatch South Africa's challenge against Monsanto over the right to access of information about biosafety and location of several GM crop field trials: numerous legal trials in the U.S. led by the Center for Food Safety to halt or challenge commercialization of GM alfalfa, GM sugar beets, and other GM crops. In India, Navdanya has been challenging companies for stealing seed knowledge and technical development from indigenous, tribal peoples—also known as biopiracy.

[12] U.S. Environmental Protection Agency, "Pesticides Industry Sales and Usage: Market Estimates" – see reports for 1998/1999 and 2006/2007, Table 3.6 in each report, http://www.epa.gov/opp00001/pestsales/. Agricultural use of glyphosate rose from 15-20 million lbs. in 1993 to 180-185 million lbs. in 2007.

[13] Ibid, 2006/2007 report. Agricultural use (180-185 million lbs) + home/garden use (5-8 million) + industrial/government/commercial use (13-15 million) = 198-208 million lbs. total (Tables 3.6 to 3.8).

[14] Hardell, L., & Eriksson, M. (1999). "A Case-Controlled Study of Non-Hodgkin's Lymphoma and Exposure to Pesticides," Cancer, 85(6), 1353–1360; Hardell L, Eriksson M, & Nordstrom M. (2002). "Exposure to pesticides as risk factor for non-Hodgkin's lymphoma and hairy cell leukemia: pooled analysis of two Swedish case-control studies," Leuk Lymphoma, 43(5), 1043-1049; De Roos, et al. (2003). "Integrative assessment of multiple pesticides as risk factors for non-Hodgkin's lymphoma among men," Occup Environ Med, 60(9).

[15] De Roos, A. J. D., Blair, A., Rusiecki, J. A., Hoppin, J. A., Svec, M., Dosemeci, M., Sandler, D. P., & Alavanja, MC (2005). Cancer Incidence among Glyphosate Exposed Pesticide Applicators in the Agricultural Health Study. Environmental Health Perspectives, 113(1), 49-54.

The Way Forward—Agroecological Farming
Many reports discuss alternative farming practices that protect the environment, sustain livelihoods and rural communities, and provide food security. In Indonesia, when restrictions were introduced on the use of 57 pesticides used in growing rice and subsidies for pesticides were eliminated, the volume of pesticides used on rice fell by more than 50 percent and yields increased by about 15 percent. Farmers' net incomes increased by $18 per farmer per season. The government saved $120 million per year by ending pesticide subsidies.[16]

In Bangladesh the "No Pest" program led to pesticide reduction of 76 percent and yield increases of 11 percent. Returns increased by an average of 106 percent in the dry season and 26 percent in the wet season.[17]

Other examples of successful agroecological, organic practices are found throughout the report from the planet.

Regional and Country Specific Reports
The following extracts highlights taken from country/regional reports. The full reports can be found at: www.navdanyainternational.it.

We highly encourage you to read the full reports as this synthesis only provides a glimpse into the powerful testimony and actions of civil society movements from every part of the world.

Voices from the Americas
Canada
Canada ranks number five in the world in total acreage under GM cultivation. Principle GM crops in Canada are canola, soy, and corn. Approximately 90 percent of all canola grown in the country is GM; and almost 65 percent of soy and corn are GM.

The U.S. is Canada's largest canola buyer. The U.S. imported an average of 510,000 tons of canola oil per year from 2000-2001 to 2004-2005, valued at $345 million/year. Canada's principal seed buyers are Japan and Mexico. China and Pakistan are also emerging as major seed buyers.

The ordeal of Percy and Louise Schmeiser, summarized in this report, is an illustration of the depth and breadth of a patenting system that strips away farmers' rights and ability to save seed. The Schmeisers, Canadian canola farmers and seed savers, were sued by Monsanto in 1996 after their fields became contaminated by GM canola. Monsanto charged that the Schmeisers owed Monsanto profits from their canola crop as well as technology fees because GM canola was found on their farm. Monsanto also asked for a million dollars in court costs.

Astonishingly, even though the Supreme Court of Canada acknowledged that the GM canola found on the Schmeisers' property was clearly the result of contamination from a neighboring farm, the Court ruled that patented GM crops are a corporation's property regardless of how the GM material spreads to another property. This ruling is an example of the perverse logic that allows corporations to claim that GM seeds and crops are "novel" and therefore can claim patent rights while simultaneously allowing corporations to claim that GM seeds and crops are substantially equivalent (i.e., not novel) when GM crops contaminate non-GM crops.

U.S.
As an early adopter of technologies involving genetic manipulation, and the largest grower of genetically modified (GM) crops (almost half of the global total), the U.S. experience is a particularly instructive example regarding the benefits versus hazards of this technology.

GM crops have been commercially grown in the U.S. since the mid-1990s without undergoing any independent testing on potential effects on public health, food safety, the environment, or on the livelihoods of farmers and economies of rural communities. As of 2009, 93 percent of soybeans, 93 percent of cotton, 80 percent of corn, and approximately 62 percent of canola, and 95 percent of sugar beets grown are GM crops.[18]

It has been estimated that approximately 70 percent of processed foods on supermarket shelves in the U.S.– from soda to soup, crackers to condiments – contain GM ingredients. Yet, there is no labeling of foods containing GMOs. There are upcoming initiatives in several states to require labeling.

Pesticide usage has increased with the advent of

[16] (Thrupp, 'New Partnerships for Sustainable Agriculture', 1997)
[17] Ibid.
[18] http://www.ers.usda.gov/Data/BiotechCrops/

GM crops. The USDA data found that GM crops in the U.S. used more than 26 percent more pesticides per acre than non-GM, conventional crops.[19] GM crops increased pesticide usage in the U.S. by 318.4 million pounds from 1996-2008.[20]

Much of the pesticide increase can be ascribed to the need to use more pesticides in an attempt to get rid of weeds that over generations have become resistant to glyphosate. From November 2007 to January 2011, the number of reports of confirmed glyphosate-resistant weeds, also known as "superweeds" in the U.S. nearly doubled from 34 to 66. Invested acreage more than quintupled, from 2.4 to 12.6 million acres. (According to aggregated data from the USDA.)

On the federal level, eight agencies attempt to regulate biotechnology using 12 different statutes or laws that were written long before GM food, animals and insects became a reality. The result has been a regulatory tangle. The U.S. Congress has yet to pass a single law intended to manage GMOs. In many ways, the Obama Administration promotes GM crops more vigorously than previous administrations. The Administration views GM crops to be part of its strategy for reducing world hunger.

In May 2011, the USDA approved a corn variety genetically engineered to resist drought. The corn was developed by a Monsanto and BASF partnership. However, the USDA's draft environmental assessment noted that the GM corn does not seem to display any traits of drought resistance that are superior to many non-GM corn varieties.

The recent deregulation of GM alfalfa was approved even though the USDA's environmental impact statement for GM alfalfa admits that gene flow between GM and non-GM alfalfa is "probable."

There are ongoing legal actions that include challenging the recent commercialization of GM alfalfa and plantings of GM sugar beets and halting cultivation of GM crops on public lands, to name a few.

Mexico

The debate over GMOs in Mexico centers around maize, or corn, as this is the core of peasant agricultural production and organization, the staple of the popular diet, and the heart of the culture. Maize is the legacy of the country's ancestors. In Mesoamerican creation stories, the human race was modeled out of cornmeal. Mexico the center of origin, diversity, and domestication of this grain and has more than 60 landraces and thousands of native varieties.

The demise of maize in Mexico began with the passage of the North American Free Trade Agreement (NAFTA) which eliminated most trade "barriers" between the U.S., Mexico, and Canada. NAFTA, which took effect in 1994, resulted in massive imports of artificially cheap, subsidized corn from the U.S. This dramatically reduced maize farmer livelihoods in Mexico and dismantled rural economies. It also provided a gateway for GM corn. As a result, corn imports from the United States increased three-fold after NAFTA, prices dropped by 50 percent, and 3.2 million producers, the majority of Mexico's small-scale producers found themselves under increasing economic pressure.[21]

In 1999, scientists of the National Council of Agricultural Biosecurity helped to establish a de facto moratorium on experimental and commercial cultivation of GM corn in Mexico. A report issued at the 2002 Conference of Pugwash, concluded that "our current knowledge is insufficient to evaluate the risks and benefits of GMOs, particularly in light of the short and long term consequences that these technologies could imply for the biosphere and future generations." A major concern was that GM corn could contaminate Mexican landraces and varieties.

In 2001, scientists from the University of California at Berkeley, Ignacio Chapela and David Quist, found that native corn varieties had been contaminated with transgenes from GM corn. The source of contamination was from U.S. corn imports, of which the majority was GM corn. (Mexico is the second largest export market for U.S. corn.)

The 2005 Biosecurity and Genetically Modified Organisms Law, often referred to as the "Monsanto Law," established three steps toward

[19] Dr. Charles Benbrook, Impacts of Genetically Engineered Crops on Pesticide Use in the United States: The First Thirteen Years," The Organic Center, Nov. 2009, p. 47 & Supplemental Table 7, http://www.organic-center.org/science.pest.php?action=view&report_id=159.
[20] Benbrook, op. cit., p. 3.
[21] De Ita Ana, Fourteen Years of NAFTA and the Tortilla Crisis, Americas Program Special Report, January 2008.

commercialization: 1) experimental cultivation; 2) pilot project; and 3) permit for commercial cultivation.

In 2007, the Law of the Seeds was passed which prohibits marketing, distributing, and exchanging non-commercial seeds. This is an assault on the traditional knowledge and technologies of peasant farmers across Mexico.
In 2009, Mexican President Felipe Calderon lifted a de facto moratorium (in place since 1999) on commercialization of GM corn. The policy to fully commercialize GM corn came shortly after a meeting between President Calderon and the president of Monsanto at the World Economic Forum in Davos, Switzerland. Between 2009 and March 2011, biotechnology companies applied for more than 110 permits to plant GM corn in Mexico. Of these, 67 have been approved for experimental cultivation. The Mexican Ministry of Agriculture issued the first permit for a pilot planting of GM corn to Monsanto in 2011.

The end of the moratorium on GM corn led to the strengthening of civil society. The Network in Defense of Maize, consisting of many farmer, grassroots, scientists, and indigenous organizations, issued a declaration—No to GM Maize in Mexico!—which was signed by 769 organizations and thousands of individuals from 56 countries.

Other GM crops have been plated in Mexico, beginning with GM cotton in 1995. GM cotton covers the greatest land area of all GM crops in Mexico and is located in nine northern states. As cotton is native to Mexico and has been cultivated for centuries, many are concerned about contamination of native cotton varieties. Approximately 83,799 hectares have been authorized to Monsanto for GM cotton production. Between 1998 and 2001, the Mexican government paid Monsanto 45 percent of the value of GM cotton inputs (i.e., seeds and royalty fees).

Latin America
Brazil is the second largest producer of GM crops in the world (approximately 25 million hectares planted with GM crops). Argentina is a close third with approximately 21 million hectares devoted to GM crops. Soybeans comprise the majority of GM crops. The large majority of GM soy crops are glyphosate-tolerant, also known as Roundup Ready (RR) crops.

Currently, in the Southern Cone (Argentina, Brazil, Uruguay, Paraguay and Bolivia) there are three GM crops: soy, maize and cotton planted in approximately 46 million hectares,which represent a third of the total area planted with GM crops in the world.

Soybeans: In Brazil, approximately 70 percent, or 16.5 million hectares, of soy crops planted in 2009/2010 were GM.[22]
In Argentina, almost all of the 18.3 million hectares of soy planted in 2010 were GM.[23]
In Uruguay, soybean crops covered 860,000 hectares (more than 85 percent of the area planted with summer crops), and almost all of it was genetically modified[24]. In Bolivia, 80 percent of the 631,500 hectares of soy were GM[25]. And in Paraguay, GM soy is planted on 2.2 million hectares (representing 60 percent of total hectares under soybean cultivation).[26,27].

Maize: In 2009/2010, about 4 million hectares were planted in Brazil.28. In Argentina, 3.7 million hectares of maize were planted, of which 2.7 million were planted with GM maize.[29]
And in Uruguay, 80 percent of the 90 thousand hectares of maize were GM[30].

Cotton: Argentina is the largest grower of GM cotton within the Southern Cone with the majority of approximately 490,000 hectares planted

[22] Article published in Gazeta do Povo, available at: http://www.gazetadopovo.com.br/blog/expedicaosafra/.
[23] Information from the Agricultural Information Integrated System available at: http://www.siia.gov.ar/index.php/series-por-tema/agricultura.
[24] Agricultural Poll –Winter of 2010. Agricultural Statistics Department, Ministry of Livestock, Agriculture and Fisheries. Uruguay, available at: http://www.mgap.gub.uy/portal/hgxpp001.aspx?7,5,27,O,S,0,MNU;E;27;6;MNU.
[25] http://www.anapobolivia.org/documento/doc_2011.02.09_221234.pdf.
[26] http://www.mag.gov.py/dgp/DIAGNOSTICO%20DE%20RUBROS%20AGRICOLAS%201991%202008.pdf.
[27] http://www.mag.gov.py/index.php?pag=not_ver.php&idx=134310.
[28] Information available at: http://www.cib.org.br/estatisticas.php.
[29] Information available at: http://www.argenbio.org/adc/uploads/imagenes_doc/planta_stransgenicas/TablaArgentinaOGM.ppt.
[30] Agricultural Poll –Winter of 2010. Agricultural Statistics Department, Ministry of Livestock, Agriculture and Fisheries. Uruguay, available at:http://www.mgap.gub.uy/portal/hgxpp001.aspx?7,5,27,O,S,0,MNU;E;27;6;MNU.

with GM.[31] In Brazil, GM cotton represented a small portion of total plantings in 2009/2010.[32]

Generally, the governments of the region, especially in Brazil, Argentina and Uruguay, have facilitated the introduction of GM crops by adapting their regulatory frameworks and basing their risks assessments on the information provided by the biotechnology industry.

Authorization for GM soy was first granted by governments in Argentina and Uruguay in 1996. Monsanto went forward with GM plantings in 2004/2005 in Brazil despite not receiving the proper authority to do so by the government. Instead of controlling and punishing those who have illegally introduced these crops into the countries, government officials have adapted their regulations to allow GM crops and often argue that because the crops already exist, they should be authorized. Today in Brazil, the authorization for approval of GM crops is under the purview of a 2005 Biosafety Law that has left decision making on GMOs to a technical committee, CTNBio. This committee is comprised of a handful of scientists, many with connections to biotechnology companies.[33] All applications for commercial release if GM crops in Brazil have been approved since 2005 as a result of the change to the approval process.

Between 1996 and 2007, the use of agrochemicals increased from 30 to 270 million liters. Herbicide imports increased 330 percent with the introduction of GM soy. As compared to use on traditional fields, 9.1 million kilograms more of herbicides were used in genetically modified soy plantations in 2001 alone.

Super weeds are emerging as a result of massive application of glyphosate[34]. In Brazil, researchers have reported that some weeds have developed tolerance to glyphosate in nine species, four of which are weeds that can cause serious problems to crops[35,36]. Over 30 million liters of glyphosate was sold in 1991, 8.2 million in 1995, to over 30 million in 1997. In 2008 between 160 and 180 million liters of glyphosate were used.

In Argentina, deforestation increased almost by 42 percent as a result of the expansion of the agricultural frontier, mainly the expansion of soy monoculture plantations. Complete habitats have been lost. Some calculations assess that in the past 30 years, Argentina has lost 70 percent of its native forests.

The high use of glyphosate has had grave implications for soil, air, water, and public health. In Argentina, health networks of Doctors in Sprayed Towns of Argentina have documented links between the increase of agrochemical use and increasing rates of cancer, miscarriages, fetal malformations and respiratory conditions, among other impacts.[37]

Voices from Europe

European Union

Almost no GM crops exist in the European Union (EU). Spain is the country with the highest amount of GM crops—70,000 hectares (out of 182 million hectares of agricultural lands) are planted with mainly GM corn. Other European countries that have planted GM crops include: Czech Republic—3,000 hectares and Portugal—500 hectares. Germany, the UK, and a few other countries have very small amounts of land growing GM crops.

Only two GMO events are presently approved for cultivation within the EU: Monsanto's "Mon-810" insecticidal maize, and a potato "Amflora" of BASF, Germany, which is supposed to ease starch processing for industrial use and presently accounts for 2 ha in Germany. "Mon 810", though officially approved by the Union, has since been banned for cultivation by Germany, Austria, France, Greece, Luxembourg,

[31] Information available at: http://www.argenbio.org/adc/uploads/imagenes_doc/planta_stransgenicas/TablaArgentinaOGM.ppt.

[32] Information available at: http://www.cib.org.br/estatisticas.php

[33] A ciência segundo a CTNBio. Revist Sem Terra Nº 53, November 2009, available at: http://boletimtransgenicos.mkt9.com/registra_clique.php?id=H|65072|15226|8993&url=http://www.mst.org.br/sites/default/files/A_ciencia_segundo_a_CTNBio_REVISTASEMTERRA.pdf.

[34] Argentina: las consecuencias inevitables de un modelo genocida y ecocida. Biodiversidad sustento y culturas Magazine, August 2009, available at: http://www.biodiversidadla.org/content/view/full/50874

[35] Review of potential environmental impacts of transgenic glyphosate-resistant soybean in Brazil. Cerdeira et al, 2007, available at: http://www.informaworld.com/smpp/content~content=a779480992.

[36] Buva "transgênica" resiste ao glifosato. Gazeta do Povo, December 1st, 2009. http://portal.rpc.com.br/jm/online/conteudo.phtml?tl%3D1%26id%3D950000%26tit%3DBuva-transgenica-resiste-ao-glifosato.

[37] http://www.reduas.fcm.unc.edu.ar/declaracion-del-2%C2%BA-encuentro-de-medicos-de-pueblos-fumigados/.

Poland, Bulgaria while Italy's GMO legislation at this moment does not allow for any cultivation of GMOs.

Although there is little GM cultivation, the EU imports around 70 percent of its animal feed, most of which is GM soy and corn from the U.S.

When GMOs were introduced in Europe in the late 1990s, consumers overwhelming rejected them. Ninety-five percent of Europeans wanted GM food labeled as such, and 65 percent indicated that they did not want them in their food at all. Still today, public opposition to GMOs remains strong.

After initial approvals for GM crops, mainly Bt corn, public protests forced a moratorium on approvals of GMOs which lasted until 2004. Since that time, several GMOs have been approved for use as food and feed. Food products containing or derived from GMOs fall under EU mandatory labeling laws; however, animal products produced with GMOs do not need to be labeled. This means that milk, eggs, poultry, and other such animal products do not have to be labeled as GMO even though animals may have been fed GM grains (as noted already, GM grains are imported from the U.S.).

In 2003, a European Food Safety Authority (EFSA) was established as a centralized system to analyze risk assessments of GMOs. Legitimacy of this panel has been questioned by civil society movements and the public as the panel consists of GMO proponents and it relies solely on biotechnology industry studies when assessing risks of GMOs.

The European Commission continues to grapple with GMOs and attempts to balance policy between industry pressure and public opinion. The biotechnology industry is exerting heavy influence with government leaders through the creation of the international lobby, International Life and Science Institute, and the ad-hoc group IFBIC, which is comprised of Monsanto, Bayer, BASF, Pioneer, and DuPont.

The need to create new energy sources opens a potential new GMO frontier in Europe. Highly subsidized fuel and energy production have triggered massive investments by industrial operators and institutional investors in agricultural industries and land. This is displacing family farmers and replacing food crops with fuel crops.

In addition to strong country and regional civil society campaigns against GMOs, regional governments have banded together via the Network of European GMO Free Regions. More than 50 regions have joined this Network. In addition to strong civil society and governmental regional networks, the Network of Independent Scientific Labs was created to provide technical – scientific sharing of acquired knowledge.

Specific Countries in Europe

France

From the time that Monsanto's MON 810 corn was put on the European market in 1998, farmers and citizens in France have fought a fierce battle to prevent GMOs from entering their country and from entering Europe. High profile acts of civil disobedience, in some cases resulting in the jailing of leading activists, made the debate on biotechnology a national issue, occupying centre-stage of social and political public debates both in France and Europe. In many other European countries, similar anti-GMO demonstrations were undertaken by activists representing farmers' unions, environmental protection groups and consumer movements.

The European network of regions opposed to GMOs created in 2005 gave a new democratic legitimacy to the fight. In 2008, after a ten-day hunger strike, the government of France declared a moratorium on the cultivation of Monsanto's MON 810, to date the only GM variety authorized in Europe. However the fight goes on as in early September 2011, the Luxembourg-based European Court of Justice, Europe's highest court, declared that France acted illegally when it imposed this ban as it had based its decision on the wrong EU legislation. In reaction to the ruling, France said its embargo on MON810 maize was still valid and that it would restart a procedure if needed.

Germany

In 2005 a first European Conference of GMO free Regions was held in Berlin, Germany. Some 200 representatives from NGOs as well as regional governments, farmer unions, science and some GMO free industries attended the meeting and adopted a "Berlin Manifesto" claiming their right to decide whether or not GMOs would be planted in their region. A few months before more than a dozen regional governments had adopted a "Declaration of Florence" demanding the same right and forming a network of FMO-free regional governments which has now grown to 55 governments and will soon welcome an additional 6 states from Germany.

Italy

Almost all regions in Italy have stood up against GM crop cultivation and, these regions have played a fundamental role in Europe in respect to regulations related to GM crop cultivation. In 2000, Tuscany was the first region to adopt a law, which prohibited the cultivation of transgenic crops in its territory. As an anti-GMO leader in Italy, and throughout Europe, Tuscany instituted several international initiatives, such as the European Network of GMO-free Regions and Local Authorities and the International Commission for the Future of Food and Agriculture. In 2005, 20 regions met in Florence and signed the *Bill of Regions and Local European Authorities on the issue of coexistence between GMOs, conventional and organic agriculture*, also known as the "Florence Bill," which identified a number of fundamental principles for governmental action on the issue of GMOs. Today, 55 regions are members of the European Network of GMO free Regions. In Italy civil society groups have also strongly reacted to the expropriation of their food rights. An alliance between social and economic organizations and a heterogeneous majority, held a national consultation on GMOs in which citizens were able to obtain information and express their preference, which not surprisingly opposed GMOs.

Norway

Although there is no legal commercial production of GMOs in Norway, its National Pension Fund invests in Monsanto. Youth-led civil society groups in Norway are engaged in a campaign calling on the finance minister to divest investments in Monsanto.

Poland

Poland retains a large peasant farming tradition of some 1.4 million small family farms that work mostly on a subsistence level. Then there is a tranche of medium- sized traditional farms and an area of large-scale monocultures. Some 2 million farmers comprise the total on farm work force.

Poland emerged into the 21st century with a reasonably robust legal act to prevent indiscriminate planting of GM seeds/crops. However, as the 2004 date of Polish entry into the EU approached, the pressure to adopt GM plants gathered momentum. Pro-GM trade representatives from the U.S. Department of Agriculture visited Poland frequently and the U.S. Embassy in Warsaw became the quasi headquarters of pro-GM lobbying activities, with close ties to the Monsanto corporation. Cargill mounted a similar offensive on the GM animal feed front and used advertising on U.S. television to depict Polish peasant farmers as an outdated, poor but romantic underclass in need of Cargill's generosity in supplying "cheap" nitrates to make them competitive.

In order to counteract the intense GM propaganda machine, civil society worked with regional governments, many of which created GMO free regions. In 2006, Prime Minister Kaczynski responded by banning the import and planting of GM seeds and banning GM animal feed. Poland thus became the first Country in Europe to enact such a ban. In 2007 a new government was elected and from this time forward, Poland is more sympathetic to accepting GMOs. Civil society has managed thus far to "hold the line" on GMOs.

Russia

Polls show that Russian society is largely opposed to GMOs with 86 percent expressing disapproval of allowing any breeding of GM seeds or crops and 73 percent are against having GMOs in food. There is a robust anti-GMO movement in Russia consisting of environmental groups, scientists, farmers, health professionals, consumers, and more.

Russian legislation does not directly prohibit the breeding of GMOs. There are procedure to permit such breeding in the Russian Federation through environmental and biological safety tests by certified scientific institutions, by the Commission of State Environmental Expertise and final consideration by the Ministry of natural resources and environment. No permit has yet been granted.

Representatives of the U.S. government and multinational biotechnology corporations strongly advocate for GMOs in Russia. During negotiations for Russia's accession to the World Trade Organization (WTO), the U.S. insisted that the Russian Federation sign a special agreement on biotechnology which calls for Russia to no longer label foods containing GMOs and establishes patent and usage rights for U.S. corporations that cultivate GM seeds and crops within Russia. These measures will go into effect upon Russia's accession to the WTO, which, at this writing, is expected to take place in 2011 or early 2012.

Independent scientific testing of the effects of GMOs on rats, hamsters, and mice have generated great concern as to the safety of GMOs. The tests have been conducted by: Dr.

Irina Ermakova, the Institute of High Neural Activity and Neurophysiology of Russian Academy of Sciences, Moscow; Dr. Alexey Surov and Dr. Alexander Baranov, the Institute of Environmental and Evolution Problems and the Institute of Developmental Biology, Moscow); and Dr. Maria Konovalova, the Saratov Agrarian University.
All three of these studies demonstrate significant biological and behavioral changes in the animals when GM soya or GM corn was put into their feed. Some of the biological effects include increased mortality among newborns in the first generation, reduced quantity of offspring, spike in sterility among second generation animals. On the behavioral front, animals became more aggressive and lost maternal instincts.

Switzerland
Despite being the home country of Syngenta, Nestle, and Novartis and despite government representatives' push for GMOs, Swiss civil society prevailed in passing a moratorium on GM crops. The moratorium, passed in 2005 and extended again until 2013, is part of the Swiss Constitution.

GM food is not allowed on the market. Some GM corn and soy are imported into the country; however, GM animal feed imports have steadily declined over the last several years and today the agriculture department of Switzerland reports that 99.9 percent of animal feed is GM-free.

Ukraine
To date, no GM crops are grown in Ukraine, although GMOs have entered the food chain supply largely through contaminated imports. Food products with a GMO content of more than 0.1 percent are subject to mandatory labeling. Applications have been submitted to Ukraine for Monsanto's Bt potato (three varieties) and Roundup Ready Maize, Syngenta's Bt maize, glyphosate-tolerant sugar beet of Snygenta and Monsanto, and Bayer's GM rapeseed. All are undergoing field trials but have not yet received final approval for commercialization.
Ukraine has ratified the UN Cartagena Biosafety Protocol; however, the country does not have a well-developed biotechnology regulatory system.

UK
A GM Freeze campaign, is underway in the UK. The campaign, an alliance of environmental groups, development charities, religious organizations, businesses, and more, is united in calling for a freeze on growing GM plants; producing GM farm animals; importing GM foods, plants, and livestock feed; and on patenting of genetic resources for food and farm crops. The campaign, supported by 125 organizations, has extended goals that include calling for independent research and assessments on human health, the environment, and socio-economic implications of GMOs.

Voices from Africa
African farmers have relied on seed diversity developed over generations. For centuries, a variety of crops have been cultivated for nutritional aspects, taste, medicines, and culture.

Africa's food security is reliant on the farmer's right to save seed and continue to develop traditional knowledge and science.

Because GM seeds and crops threaten seed diversity as well as farmers' rights to save seed, Africa is largely free of GM commercial crops. However, in recent years a strong push from the biotechnology industry has resulted in an increase in GM field trials and commercialization.
South Africa was the first country in the region to approve GMOs. Beginning in 1997, South Africa has mainly grown GM maize, cotton, and soybeans. Potatoes, cassava, sugar cane, and grapes are examples of other GM crops that have been field-tested.

Several African countries are now moving toward GM crops. Nigeria has performed field trials on cassava and cowpea; Egypt on maize, cotton, wheat, potato, cucumber, melon, and tomatoes; Kenya on maize, cotton, cassava, sweet potato; and Uganda on banana, maize, cotton and sweet potato.

The Kenya Agricultural Research Institute (KARI) has been strongly influenced to direct its research toward GMOs as a result of funding it receives from Monsanto, Syngenta, and U.S. Agency for International Development (USAID). In Tanzania, the president recently announced a new initiative, "A New Vision for Agriculture," in collaboration with Monsanto, Syngenta, and USAID. In Burkino Faso, Monsanto and Syngenta Foundation funded the Institute for Environment and Agricultural Research to carry out trials of Bt cotton.

There are several industry-connected organizations working in many countries in Africa to promote GM seeds and crops and facilitate entry into Africa. The groups organize training, study trips, conferences, and also actively

lobby for biotechnology in Africa. Groups include: Agricabio, the African Agricultural Technology Foundation, African Biotechnology Stakeholders' Forum, Africa Harvest Foundation International, the Association for Strengthening Agricultural Research in Eastern and Central Africa, and the Open Forum on agricultural Biotechnology in Africa.

Many civil society groups in Africa are concerned about the massive influence of the Alliance for a New Green Revolution in Africa (AGRA), headquartered in Nairobi, Kenya. A consortium of industry, institutes, banks, and foundations such as the Bill and Melinda Gates Foundation, AGRA aims to bring a "Green Revolution" to Africa, based on an industrial agriculture system dependent on commercial seeds and chemical inputs. Several former Monsanto officials work for the Gates Foundation, which has invested more than $34 million in shares of Monsanto stock. Many speculate that AGRA will serve as a key venue for the technology's entry into Africa.

Counter to the touted claims that Bt cotton is helping small-scale farmers in South Africa's Makhatini Flats, after five years, the majority of farmers growing Bt cotton are now in debt and the number of farmers still growing the GM cotton has reduced by 80 percent. This story is typical of what happens throughout Africa. During the first year of GM plantings, companies and governments provide price supports for purchasing seeds and chemicals. They also provide infrastructure supports such as irrigation, extension services, farmer credit, and access to markets. At times, due to these supports, farmers experience a jump in income. However, after the first year of conversion, support is then withdrawn and lower crop yields and incomes result.

Contamination is a central issue in Africa as Africans migrate and seeds spread easily from one country to another. GM food and seeds are often dumped on unsuspecting Africans, often under the guise of being food aid.

In 2006, GM rice (LibertyLink Rice), unsuitable for human consumption, was found in West Africa. In Burkina Faso, approximately 3,000 organic farmers found their cotton contaminated with GM genes. This has affected their organic certification and their ability to sell to premium markets.

In South Africa, Biowatch engaged in a legal challenge with Monsanto over the right to access of information about biosafety and location of several GM crop field trials. After a protracted legal battle, the courts ruled that Monsanto was required to give the public access to most of the requested information public. However, prolonged legal procedures and expenses severely impacted the financial stability of Biowatch.

A weak biosafety law, promoted by a pro-GMO agricultural secretary, was passed in 2009 in Kenya. This further opens Kenya's door to GM seeds and crops. In August 2011, the government finally gazetted rules to allow GMO foods into Kenya. This has opened a new battlefront, with activists and a group of opposing scientists plotting court actions to block the regulations.

Ethiopia's biosafety laws follow a precautionary approach to GMOs; however, some civil society groups and researchers are finding that GM seeds and crops are being brought into the country illegally (via an underground market).

GMOs are allowed in South Africa; however, the Biodiversity Bill requires that GMOs be monitored, and the recently approved Consumer Act requires compulsory labeling of GMOs.

In Benin, civil society led a campaign that led to the renewal of a moratorium on GM. Mali also has maintained strict laws on GMOs.

Voices from Asia Pacific

Australia

Australia was an early adopter of GMOs. GM cotton was grown in the country beginning in 1996. The Florigene blue carnation, RR canola, and Bayer's LibertyLink canola followed shortly thereafter. Licensing for these products was granted even though there was no governmental research or assessment on potential health, safety, or environmental risks.

In the early 2000s, some state governments imposed temporary moratoria on the sale of GM seed. Most of the bans have now been lifted due to intensive campaigns undertaken by the biotechnology industry that included lobbying, marketing, and infiltrating research and scientific institutions. The intensity of the GM advocates is illustrated by a touring workshop geared for corporate executives entitled, "How to Beat Activists at Their Own Game." At one of the workshops, a speaker advised participants to "Take the moral high ground. …Tell politicians that when they support biotechnology they are demonstrating much needed moral and political leadership. Conversely, you may want to point out the immorality of those who oppose biotechnology."

The "revolving door" syndrome in which industry staff are hired for government posts is standard practice in Australia and has, predictably, resulted in legislation and policies that promote GM technologies. The symbiotic relationship between the Australian government and the biotech industry is further evidenced by the fact that, by 2010, Monsanto owned major shares in public-owned agricultural enterprises. State government departments also develop GM crops under contracts with biotech corporations.

Scientists in Australia are discouraged from airing concerns about GMOs in a few different ways. First, biotech companies simply refuse to allow analysis of their patented products. Second, several scientists have been dismissed from their posts after conducting research that questions the safety of GMOs.

There is limited labeling of foods containing GMOs. All GM vegetable oils, starches, and sugars, as well as eggs, meat and milk from animals fed with GM grains are exempt from any labeling. State governments are responsible for labeling standards; this greatly dilutes monitoring, testing, or enforcement of GM labeling.

India

In 1998, Monsanto with its Indian partner Mahyco, started illegal GM field trials in India, without approval of Genetic Engineering Approval Committee (GEAC), the statutory body for approving the release of GMOs into the environment.

Monsanto now controls 95 percent of the cotton seed market. It controls 60 Indian seed companies through licensing arrangements. It has pushed the price of seed from Rs. 7/kg to Rs. 3600/kg. Nearly half of this pricing reflects royalty payments.

The technology of engineering Bt genes into cotton was aimed primarily at controlling pests. However, new pests have emerged in Btcotton, leading to higher use of pesticides. In Vidharbha region of Maharashtra, which has the highest rate of farmer suicides, the area under Btcotton has increased from 0.2 million hectares in 2004 to 2.88 million hectares in 2007. Costs of pesticides for farmers has increased from Rs. 921 million to Rs. 13,264 billion in the same period, which is a 13-fold increase. Seed cost for cotton jumped from Rs. 7 to Rs. 3500 per kg. when Bt cotton was introduced.

In spite of Indian studies showing losses to farmers and in spite of the first Bt varieties not getting approval because of bad performance, and in spite of the fact that the state government of Andhra Pradesh is suing Monsanto for Bt cotton failure, Monsanto uses scientists to put out pseudo studies that claim that Indian farmers have benefitted from Bt cotton. Such studies are reliant on data supplied by the biotech industry; often the data is manipulated.

An example of Monsanto's manipulations of data is evident from the fact that Mahyco published data for 40 Bt cotton trial sites in areas where state governments had uprooted most of the Bt cotton in the trial sites.

Most of the 250,000 farmers suicides in India are in the cotton belt of Maharashtra, Punjab, Andhra Pradesh and Karnataka, and most cotton is now Monsanto's Bt cotton.

The International Food Policy Research Institute (IFPRI) released a report claiming that farmer suicides were not related to Bt cotton. However, the report is manipulative of the truth about farmer suicides and Btcotton at every level.

As one example, the report claims that farmer suicides has been a "long term" phenomena and cites statistics from the period of 1997 to 2007. However, ten years is not long term in a 10,000 year old farming tradition. And 1997 is precisely when the suicides take on an epidemic proportion due to seed monopolies, initially through hybrids and from 2002 through Bt crops. Also, the chronology of Btcotton introduction is false. The story begins with Monsanto's illegal Bt trials, not with commercialization in 2002.

Secondly, the report states that "In specific regions and years, where Btcotton may have indirectly contributed to farmer indebtedness (via crop failure) leading to suicides, its failure was mainly the result of the context or environment in which it was introduced or planted; Btcotton as a technology is not to blame". This is an interesting argument. A technology is always developed in the context of local socio-economic and ecological conditions. A technology that is a misfit in a context is a failed technology for that context. You cannot blame the context to save a failed technology.

In 2010, Monsanto admitted that the bollworm had become resistant to its Bt cotton in India. It then introduced Bollgard II with two Bt genes. It will be followed by Bollgard III, with three Bt genes. The toxic treadmill serves Monsanto well, but locks farmers into dependency of ever

increasing seed and pesticide costs, which will push them deeper into debt and suicide. Monsanto was caught undertaking illegal GM corn trials in the states of Bihar and Karnataka. According to India's Biosafety Laws, states must approve trials; however, Monsanto had not sought any such approval. The Chief Minister of Bihar wrote to the Environment Minster to stop the trials.

In February 2010, the Minister of Environment of India, Jairam Ramesh, after conducting public hearings across the country, ordered a moratorium on the commercial release of Bt Brinjal (eggplant). The hearing process exposed the unscientific basis on which genetically engineered crops are being commercialized and the regulatory chaos and corruption in biosafety.

Monsanto is on the board of the US-India Knowledge Initiative in Agriculture, a bilateral free trade agriculture agreement. This is one example of how it gains access and exercises undue influence on the U.S government and the government of India.

Japan

There is currently no commercial cultivation of GM crops in Japan; however, because Japan imports approximately 60 percent of its food and much of it is GMO, people are consuming GMO foods.

Monsanto works with the U.S. government to minimize any labeling standards in Japan. As a result, labeling requirements are not comprehensive. For example—there are no mandatory rules to label oil products, most of which contain GM soy, corn, or canola. Japan also does not require labeling for animal feed. And, Japan now allows food with GMO residues of up to 5 percent to be labeled as "non GMO."

GMOs are also entering Japan via food and seed imports. GM canola seeds, spilled in transport, are a particular problem and have crossed with existing agricultural crops, weeds, and edible plants. Wild-growing canola has been contaminated by the GM canola and trans-gene hybridization has occurred with food crops such as broccoli and weeds such as tumble mustard.

When contamination is found, Monsanto claims its patent rights, but does not take responsibility for the threat to biodiversity caused by the spilled GM canola.

⋆ *Debbie Barker, International Program Director, Center for Food Safety, Washington D.C. Formerly served as the co-director of the International Forum on Globalization (IFG), a think tank that analyses and critiques forms of economic globalization from 1996 to 2008. She recently authored 'The Wheel of Life: Food, Climate, Human Rights and the Economy' issued by the CFS and the Heinrich the Heinrich Böll Stiftung Foundation and 'The Predictable Rise and Fall of Global Industrial Agricultur'e, which highlights international policies causing ecological and social harm, and provides alternative strategies to the current food system.*

III. Twelve Paragraphs on Biotechnology*

Wendell Berry

I.
I understand, from my scientific mentors and my reading, that there are two areas in which the relationship of causes and effects is highly complex: that which is internal to organisms, and that of the larger natural and human contexts – ultimately the world. In biotechnology, as in any technology affecting living systems, there is nothing perfectly predictable. What we do within living bodies and in the living world is never a simple mechanical procedure such as threading a needle or winding a watch. Mystery exists; unforeseen and unforeseeable consequences are common.

II.
As applied in the living world, biotechnology, like any technology, will be used with specific and necessarily limited intentions for specific and limited purposes. Like any technology so applied, it risks unpredicted effects; and it will have, even less predictably, what we might properly call influences, not only on the biological and ecological systems in which it is applied, but also on human economies, communities, and cultures.

III.
It is therefore not surprising that the criticism of the work so far of the biotechnologists has begun with the accusation that their publicity and advertising their science has been seriously oversimplified, and thus made available for the same sort of aggressive mass marketing that sells breakfast cereal.

IV.
Biotechnology, as practiced so far, is bad science – a science willingly disdainful or ignorant of the ecological and human costs of previous scientific-technological revolutions (such as the introduction of chemistry into agriculture), and disdainful of criticism within the scientific disciplines. It is, moreover a science involved directly with product-development, marketing, and political lobbying on behalf of the products – and, therefore, is directly corruptible by personal self-interest and greed. For such a science to present itself in the guise of objectivity or philanthropy is, at best, hypocritical.

V.
Further problems arise when we consider biotechnology as an "agribusiness". As such, its effect will be to complete the long-established program of industry in agriculture, which has been to eliminate the ecological and cultural "givens": natural fertility, solar energy, local genetics, agronomic weed and pest control, animal husbandry – and now the entire genetic commonwealth. The aim, in short, is to require every farmer to come to a corporate supplier for every need.

VI.
As a science specifically agricultural, biotechnology would enlarge, and worsen, another problem related to the industrialization of farming; that is, the failure to adapt the farming to the land. In agricultural biotechnology, as in industrial agriculture generally, the inevitable emphasis is upon uniformity – in crop varieties, livestock breeds, methodologies, animal carcasses and so on.

VII.
But as local adaptation is the inescapable requirement for the survival of species, so is the indispensable criterion for an enduring agriculture. Ultimately, the problem of agriculture – as such, not as an industry – will be solved on farms, farm by farm, not in laboratories or factories. And so we must regard every proposed industrial solution to an agricultural problem – including biotechnology – as potentially a distraction from the real problem and an obstacle to the real solution.

VIII.
Finally, to do full justice to this issue, we must consider the likelihood that genetic engineering is not just a science, a technology, and a business but is also an intellectual fad and to some extent an economic bubble. It is being sold, and therefore oversold, as the latest answer-to-everything: it will solve the problem of hunger; it will cure every disease; it will "engineer our emotions, to make us happy and content all the time" (even, presumably, when we are broke, friendless, and have been hit by a car): it will permit everybody's genome to be "read" in a sort of new-age palmistry. It is swarmed about by speculators and by what Sharon Kardia of the University of Michigan called "snake oil salesmen".

IX.
Biotechnology also is extremely expensive in comparison to conventional plant breeding and is costly to farmers. Some biotechnology companies are begging for money, while others are giving huge grants to university microbiology departments. The industry's attitude toward farmers is hostile, as demonstrated by its lawsuits against them and its pursuit of the "terminator gene". Its attitude toward consumers is aggressive and contemptuous, as demonstrated by its campaign against labelling.

X.
The biotechnology industry is thus founded on questionable science, is ethically obscure, is economically uncertain; it involves unconfronted dangers to the natural world and human health, and its economic benefit to farmers or to food production has not been demonstrated. It is the sort of gamble typically attractive to corporate investors and venture capitalists, who in fact have supported it lavishly. Any biotechnology enterprise that fails to attract sufficient funds from those sources should be considered to have failed a critical test. Such an enterprise cannot responsibly be bailed out with public funds or with funds dedicated to the relief of distressed farmers. To do so would be, in effect, to levy a tax for the support of a private business. It would be a breach of trust.

XI.
Richard Strohman, of the University of California-Berkeley, has proposed that the problems of biotechnology arise, not because the science is new, but because it is old. He sees it is a development of a new outdated paradigm according to which scientists have undertaken to supply simple solutions to complex problems, without due regard to the complexity of the problems. The proper scientific response to this, he says, is to enlarge the context of the work.

XII.
If biotechnology is not a sufficient, or even an adequate, answer to agricultural problems, then what do we need? My own answer is that we need a science of agriculture that is authentically new – a science that freely and generously accepts the farm, the local ecosystem, and the local community as contexts, and then devotes itself to the relationship between farming and its ecological and cultural supports.

⋆ *From Citizenship Papers, 2002*

Wendell Berry is a conservationist, farmer, essayist, novelist, professor of English, and poet. The New York Times has called Berry the "prophet of rural America." Wendell Berry is the author of more than 30 books of essays, poetry and novels. He has worked a farm in Henry County, Kentucky since 1965.

IV. VOICES FROM GRASS ROOTS

A. The Americas

CANADA : David versus Monsanto Goliath

*Percy Schmeiser, Canadian farmer**

Percy Schmeiser is a Canadian farmer and seed saver, who was sued by the biotechnology corporation Monsanto in 1996, after his fields became contaminated by their patented Genetically Modified Organisms (GMOs). Monsanto sought the profits from his entire crop, a technology charge, plus a million dollars in court costs. Eventually, the Supreme Court of Canada dismissed Monsanto's financial claims but ruled the patented genetically modified (GM) crops are the company's property. This ruling opened the door for massive class action lawsuits currently underway against Monsanto for losing control of its patented crops.

This piece is adapted from a transcript of Percy Schmeiser in a Global Vision video interview, produced and directed by Michael O'Callaghan at the Terra Madre festival hosted by Slow Food in Turin, Italy in October 2004. Online at *http://www.gmfreeireland.org/interviews/schmeiser.php*

Percy Schmeiser:
Monsanto laid a lawsuit against me back in 1996. This was a patent-infringement lawsuit where they said I was growing Monsanto's Genetically Modified (GM) canola (i.e. rapeseed) without a license.

I had never ever bought their seed and never been to one of their meetings. I didn't even know any Monsanto representative.

This was a big concern to us at that time, because we were seed developers of canola for over half a century. So, we realized there was a strong possibility our pure seed was contaminated, and indeed later on we did find it was contaminated by Monsanto, against our wishes.

Our fields got contaminated through direct seed movement from GMO canola blowing in from other farmers' fields, or when farmers hauled it with their trucks it blew off. We were contaminated, and we stood up to Monsanto, and eventually it went all the way to the Supreme Court of Canada.

Monsanto Loses Lawsuit against Farmer
Monsanto did not win the case. In the initial pre-trials, Monsanto withdrew all allegations that we had ever obtained or grown their seed illegally. But they said that didn't matter. The fact that Monsanto found some of their GMO canola plants in a ditch along one of our fields meant that we had violated their patent. So that's basically what it went to court on – patent law. They have a patent on a gene which they inserted into canola which makes it resistant to their chemical Glyphosate or Roundup [also known as "Rodeo" and "Accord", glyphosate is the most common worldwide weed killer; it has known health risks for humans ó Ed].

The first trial judge at the Federal Court of Canada ruled – and this is what made my case become internationally known – that it doesn't matter how Monsanto's GMOs get into any farmers' fields, whether you're an organic farmer or a conventional farmer. If it gets in there, you no longer own your

seeds or plants. They become Monsanto's property. The rate of contamination doesn't mean anything. Whether the contamination is one percent or fifty percent, you no longer own your seeds or plants. And furthermore, he ruled, even though we were seed developers who have been developing our own seeds for over half a century, we no longer could use our seeds or plants and they became Monsanto's ownership.

He also ruled that all our profit from our 1998 canola crop (we had approximately 500 hectares seeded) had to go to Monsanto – even from fields in which tests showed there had been no contamination. He said since we were seed developers using our own seeds from year to year, there was a probability of contamination. So basically, he ruled that a farmer ought to and should know when his fields were contaminated.

But how do you do that when your seeds look identical and your plants look identical? Based on this logic, we then stood up to Monsanto again and took it all the way to the Supreme Court.

Now, the Supreme Court ruled that I did not have to pay Monsanto one red cent. At one time Monsanto had wanted their court costs and came after me for a million dollars. They wanted a $15 per acre technology charge; they wanted all my profits from my 1998 crop on 500 hectares. They didn't get a cent. But the Supreme Court of Canada ruled that Monsanto owns and controls the gene if they have a patent on it. And that, I think, was a major loss for Monsanto, because if you own and control the gene and it gets out of control, you have a massive liability issue!

I believe that's what Monsanto is going to be faced with now. If they own and control it and it gets out of control, they are responsible. I think you are going to see Monsanto faced with liability issues in the not-too-distant future.

Note: The Organic Agriculture Protection Fund, based in Percy Schmeiser's Canadian province of Saskatchewan, filed a class action lawsuit against Monsanto and Aventis (now Bayer) for damages caused by the introduction of GM canola and for an injunction to stop GM wheat. Following Monsanto's withdrawal of its application for regulatory approval of its Roundup Ready GM wheat in Canada and the USA in June 2004, the class action lawsuit is now focusing on the biotech companies' liability for GM canola contamination. On the February 2nd 2004 the claim was amended to include compensation for the ongoing costs of removing GM canola from certified organic farmers fields and seed supplies. The Organic Agriculture Protection Fund claims that, if biotech companies are allowed monopoly rights over their patented genes wherever they occur (as per the Canadian Supreme Court decision in Schmeiser vs. Monsanto in May 2004), then these companies must also be liable for the losses due to unwanted presence of these patented genes. This case is expected to set a world-wide precedent that will establish liability of companies for the uncontrolled spread of GMOs. Details may be found at Saskatchewan Organic Directorate]

Seed Saving & Food Sovereignty: The Threat of a Monsanto Monoculture

What Monsanto is really after is total control of the seed supply, which ultimately allow them to achieve total control of the food supply. The threat to the seed supply is very crucial, because an organic farmer or a conventional farmer could wake up tomorrow morning and no longer own his seeds or plants – or no longer be allowed to use his seeds or plants, which would become owned by Monsanto. So you would lose all your indigenous seeds, your heritage seeds – everything – through cross-pollination, direct seed movement or contamination.

That's why it's so important not to introduce GMOs into any region of any country. There are two important things that come up:

The first most important thing is **there is no such thing as containment**. Once you introduce GMOs into the environment – a new life-form – the seeds will spread by wind, the pollen will flow, cross pollination will take place, and there will be direct seed movement by people, farmers hauling it, birds, bees, animals and so on.

The second important thing is that there **is no such thing as co-existence**. Once you introduce a GMO into a country or region, like happened to us in Canada, you will destroy the organic farmer and you will destroy the conventional farmer because of the cross-pollination and the contamination.

And since a genetically modified gene is a dominant gene, it will render any seeds or plants it contaminates into genetically modified organisms, you are left with no choice. In Western Canada, the organic farmers choice in raising canola has been taken away- it is all contaminated with GMOs .Nor can farmers grow organic or conventional soybeans, because within five or six years it has all been contaminated with GMOs. Now in Canada, we are left with only GMO canola and GMO soybeans.

Therefore it's very important for farmers in any country to be concerned, because you will never have a choice left again, all your crops will eventually become GMOs.

Then there are the contracts, the suppression of farmers' rights and their freedom of speech with the contracts. Some of the issues in the contracts include: first- if you commit some violation you have to sign a non-disclosure form and second- you cannot tell the press or your neighbours what Monsanto has fined you or that it has made you destroy your crop.

Monsanto has a very large police force in Canada and in the States they hire investigation services to police farmers, to go out to farmers's fields or granaries, to check without their permission, to go on their land or into their granaries. You have to permit Monsanto's forces.

And you are not even allowed to use your own seed. You only can buy the seed from Monsanto. You have to use the chemicals from Monsanto. You have to pay them a license fee or technology charge of $15 an acre each year.

I don't think that farmers want to be under this kind of control! And then there are the lawsuits by Monsanto against farmers, of which there have been hundreds and hundreds in Canada and the United States.

Therefore, do not introduce GMOs in your countries; it does not increase yields and the quality is poor. Additionally, you have more chemical use than ever before, because a lot of the canola plants have spawned superweeds, which now require a multitude of new chemicals to control since they have become resistant to the existing herbicides.

If you recall back to Monsanto's claims to Canadian farmers back in 1996 they promised: increased yields, more nutritious crops, and less chemicals. All turned out to be false. We do not have increased yields, we do have more chemical use, and furthermore the crops have poorer quality.

Is it true that Monsanto is bombing farmers in Canada?
Yes, Monsanto tries to intimidate and harass farmers. If they can't find a farmer at home, they take a small plane or helicopter and fly over the centre of a farmer's field. Our fields in Canada are quite large, normally about 160 acres, and in the centre they drop a Roundup herbicide-spray bomb. This covers an area with the herbicide.

They will then fly back when the chemical has had time to activate, to check on the crop where they dropped the bomb. And if the crop has died, they know the farmer was not using Monsanto's GMO Canola or soybeans. But if it hasn't died after being sprayed with the Roundup herbicide, they know the farmer has been using (or been contaminated by) Monsanto's seeds.

This is just one of the intrusive ways Monsanto tries to control farmers by harassing them or checking on them without their permission.

Is it true Monsanto has a clause in its GM seed contract which forces the farmers and their children and their grandchildren to forever waive their right to hold Monsanto liable and sue them if something goes wrong?
This is also true! If you have any problem, for instance if you were growing Monsanto's GMO canola and you had a major problem with it, you couldn't even take Monsanto to court. You waive your rights of ever taking Monsanto to court in a lawsuit or talking to the media about your problem.

Basically they acquired control over your freedom of speech and expression, you cannot sue them, and you cannot use your own seed. You always have to go back to buy your seed year after year, and you have to use their chemicals! It's a total domination of the seed supply, which is what they want, and it will ultimately give them total control of the food supply.

That's what it's all about. Increased chemical use, but most of all they want to control of the seed supply, and farmers lose control when they go GMOs.

Farmers should look at GMOs very closely. Don't allow it in, because once you do there is no calling it back! I guarantee you, if you introduce it today and I come back four or five years from now, it will be all over your country.

** **Percy Schmeiser** and his wife Louise, farmers from Bruno, Saskatchewan, Canada have been farming for close to 60 years. Almost on the verge of retirement, he became an international symbol and spokesperson for independent farmers' rights and the regulation of transgenic crops during his protracted legal battle with the agrichemical company Monsanto Company when he and Louise decided to not back down to Monsanto's threats and intimidation. He was the subject of the 1999 film David Versus Monsanto by Bertram Verhaag.*

A. The Americans

UNITED STATES
The State of GMOs

*Debbie Barker, Center for Food Safety (CFS)**

Part I: Introduction

As an early adopter of technologies involving genetic manipulation, and the largest grower of genetically modified (GM) crops (almost half of the global total), the U.S. experience is a particularly instructive example regarding the benefits versus hazards of this technology.

GM crops have been commercially grown in the U.S. since the mid-1990s without undergoing any independent testing on potential effects on public health, food safety, the environment, or on the livelihoods of farmers and economies of rural communities. As of 2009, 93 percent of soybeans, 93 percent of cotton, 80 percent of corn, and approximately 62 percent of canola, and 95 percent of sugar beets are GM crops.[1] The U.S. leads all nations in GM crop production with a total of 66.8 million hectares under cultivation. (Brazil follows with 25.4 million GM hectares.)

Numerous other GM crops are being field tested in the U.S.: tobacco, tomato, rice, peanuts, strawberry, papaya, and more. (Approximately 47,000 field trials of GM crops have been authorized by the U.S. government.) As discussed in the Legal section below, the USDA recently approved commercialization of GM alfalfa and GM Kentucky Bluegrass.

In addition, the U.S. carries out field trials for "pharma" crops— plants genetically engineered to produce pharmaceutical and industrial chemicals to be used for growth hormones, vaccines (for humans and farm animals), industrial enzymes, and more. The threat of contamination from these crops grown for medicines to food crops is of great concern even to many who do not oppose GM food crops.

It has been estimated that approximately 70 percent of processed foods on supermarket shelves in the U.S.– from soda to soup, crackers to condiments – contain GM ingredients. Fructose corn syrup is one example, most of it is made today from GM corn, and it is a staple ingredient of processed foods in the U.S. And, because labeling of GM foods is not allowed, most consumers have no idea that they are undoubtedly eating these foods every day.

California, one of the largest agricultural producers in the U.S., and approximately 14 other states are considering labeling legislation for GM foods. U.S. polls show that the majority of consumers want to know if genetically modified organisms (GMOs) are in their food. Yet prior efforts to label GMOs have been defeated due to the colossal lobbying efforts of the biotech industry and enormous sums of money spent to defeat such campaigns.

The state of Alaska passed a law in 2005 requiring that all fish and mollusks raised in the state be labeled if they are genetically modified. Several other states have banned GM fish in their waters.

Part II: Fact from Fiction

Increased Pesticide Use Associated with GM Crops

Herbicide-tolerant crops are engineered to withstand direct application of an herbicide intended to

[1] http://www.ers.usda.gov/Data/BiotechCrops/

eliminate nearby weeds. (Herbicides comprise by far the largest category of pesticides, defined as any chemical used to kill plant, insect, or disease-causing pests.)
Approximately 84 percent of global biotech crop acreage is herbicide-tolerant.[2] The vast majority of these crops are Monsanto's glyphosate-tolerant, Roundup Ready (RR) varieties. Insect-resistant Bt cotton and corn produce their own built-in insecticide(s). This genetic trait was derived from the soil bacterium *Bacillus thuringiensis* (Bt),that is an insecticide.

- The U.S. Department of Agriculture (USDA) data, found that GM crops in the U.S. used over 26 percent more pesticides per acre than non-GM, conventional crops.[3]
- GM crops increased pesticide usage in the U.S. by 318.4 million pounds from 1996-2008.[4]

Much of the pesticide increase can be ascribed to the need to use more pesticides in an attempt to get rid of weeds that over generations become resistant to glyphosate. Known as "superweeds," farmers are forced to use more dangerous pesticides, such as 2-4D, in attempts to control them.

SuperWeeds
Agronomists around the world are alarmed by the growing epidemic of weeds, also known as superweeds, that have evolved resistance to glyphosate as a result of the intensive use of this herbicide on Monsanto's RR crops.[5] From November 2007 to January 2011, the number of reports of confirmed glyphosate-resistant weeds in the U.S. nearly doubled from 34 to 66. Invested acreage more than quintupled, from 2.4 to 12.6 million acres. (According to aggregated data from the USDA.)
Superweeds are also causing severe financial hardships for farmers through increased weed control costs. As one example of how farmers are losing, in Illinois the use of RR soy has resulted in a huge increase in weed control expenses. Prior to RR seed, costs averaged $26 per hectare; today weed control for GM crops costs farmers between $40 to $60 per hectare. The problem of superweeds has been so acute that in 2010 the House Oversight and Government Reform Committee held two hearings—in July and September—on the issue of glyphosate-resistant superweeds.[6]

And Now—Super Insects
Bt-resistant super insects are emerging in the U.S. Rootworms are developing a resistance to Monsanto's Bt corn in the states of Iowa and Illinois. (In India, Monsanto has finally acknowledged that a bollworm pest has developed resistance to its Bt cotton.)

The Myth of Higher Yields
A review done by the Union of Concerned Scientists (UCS), entitled *Failure to Yield*, found that GM soybeans and corn in the U.S. have not increased intrinsic yields any more than industrial methods. (Intrinsic yield reflects the potential yield if grown under ideal conditions.)[7]

The study did find that GM corn yields, averaged over 13 years, exhibited an operational increase, meaning the yield that is obtained under actual conditions. However, the review found that these corn yield increases were due mainly to conventional breeding. Only 0.2-0.3 percent yield increase per year was attributed to the Bt insect-resistant trait in corn since the technology's introduction in 1996. In other words, traditional breeding methods were the major reason for increased yields.

The review also notes that, in contrast to GM technology, traditional breeding (both for industrial seeds and non-industrial seeds) and low-input farming methods have produced tremendous yield increases.

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[2] ISAAA, 2009
[3] Dr. Charles Benbrook, Impacts of Genetically Engineered Crops on Pesticide Use in the United States: The First Thirteen Years," The Organic Center, Nov. 2009, p. 47 & Supplemental Table 7, http://www.organic-center.org/science.pest.php?action=view&report_id=159.
[4] Benbrook, op. cit., p. 3.
[5] S.B. Powles (2010). "Gene amplification delivers glyphosate-resistant weed evolution," Proceedings of the National Academy of Science 107: 955-56.
[6] http://oversight.house.gov/index.php?option=com_content&view=article&id=921%3A07-28-2010-domestic-policy-qare-superweeds-an-outgrowth-of-usda-biotech-policy-part-iq&catid=15&Itemid=1.
[7] Failure to Yield, UCS

(See *Can Agroecological, Organic Farming Feed the World?)*
Even the USDA, often a proponent of GM seeds, reports that "currently available GM crops do not increase the yield potential of a hybrid variety. […] in fact, yield may even decrease if the varieties used to carry the herbicide-tolerant or insect-resistant genes are not the highest yielding cultivars."[8]

New Developments in GM Crops
In May 2011, the USDA approved a corn variety genetically engineered to resist drought. The corn was developed by a Monsanto and BASF partnership. For many years the biotech industry has been claiming that "climate friendly" GM crops will soon be developed. With this GM corn, Monsanto is claiming to have delivered on that promise. However, the USDA's draft environmental assessment noted that the GM corn does not seem to display any traits of drought resistance that are superior to many non-GM corn varieties.

Earlier this year, Pioneer Hi-Bred International began offering drought-resistant corn (developed through traditional, non-GM breeding) in Texas, Colorado, Kansas and Nebraska.

New GM Products Using Stronger Chemicals
The new era of GM technology is troubling as well. For example, Dow is awaiting USDA approval of corn and soybeans resistant to 2,4-D, a chemical related to a defoliant used in the Vietnam War and a known carcinogen and endocrine disruptor, Agent Orange.[9]

Crop Contamination
The most publicized case of contamination in the U.S. centered around Starlink, a variety of GM corn that was deregulated with the stipulation that the corn could only be grown for non-human use because of concern that a protein within the variety could cause allergic reactions in humans. In 2000, tests by the advocacy coalition, Genetically Engineered Food Alert, found traces of Starlink in hundreds of products in supermarkets across the country. This triggered a massive recall of all contaminated products.

An even more disturbing aspect of this incident is that it appears that both the government and Aventis, the owner of the Starlink patent, knew that the human food supply was tainted with the GM corn in 1999, and possibly as far back as 1997. (Aventis reported in a 2001 report that 430 million bushels of stored non-GM corn from 1999 contained traces of Starlink.) Additionally, it has been reported that traces of Starlink still appear in American exports and in food aid shipments despite the fact that Starlink crops are now prohibited. The Union of Concerned Scientists note that perhaps inbred lines remain contaminated with Starlink genetic sequences and these are then reintroduced into the seed supply when producing hybrid corn seed.

Other Studies on Contamination
The release of GM seeds and crops on the market and in the fields are known to contaminate non-GM varieties which reduces the biodiversity needed for food security, which is particularly essential in our time of climate change. A 2004 report by the UCS, *Gone to Seed,* revealed that at least 50 percent of corn, soybean, and 83 percent of canola was contaminated at low levels - roughly in the range of 0.05 to 1 percent. However, as the report notes, contamination at these levels is quite significant when one considers that this level means that 6,260 tons of GM-derived seeds, an amount that would fill 240 large tractor-trailer trucks, were contaminated.

The recent deregulation of GM alfalfa was approved even though the USDA's environmental impact statement for GM alfalfa admits that gene flow between GM and non-GM alfalfa is "probable." The GM alfalfa case represents a troubling precedent for future government approaches toward GMOs.

[8] USDA, Who Benefits from GM Crops, pg. 7)
[9] www.beyondpesticides.org/pesticides/factsheets/2,4_D.pdf

While the USDA bluntly admitted that the threat of contamination from a GM crop to a non-GM crop would be significant, the agency appears to be moving toward a "new paradigm based on coexistence and cooperation" between GM and non-GM agricultural systems.

At the Future of Food conference held in Washington, D.C. in spring of 2011, U.S. Secretary of Agriculture Tom Vilsack announced that he was assigning a committee of "20 smart people" to devise a plan to address farmers' concerns about potential contamination in their fields. Farmers producing for non-GM markets are especially concerned that their livelihoods could be wiped out if their crops became contaminated.

The 20-smart-people "solution" abdicates the responsibilities of the government and many believe displays a shocking disregard for democratic processes. (For example, in 2010 more than 200,000 people submitted comments to the USDA urging it not to commercialize GM alfalfa.) In the meantime, GM alfalfa is now being planted with no restrictions pertaining to the proximity of GM alfalfa to non-GM alfalfa, and no plan for how to compensate farmers growing for the non-GM market when their crops are contaminated.

What else is disconcerting is that the USDA's auditor found that the department has failed to adequately monitor open-air field trials of GM crops (which number more than 47,000), including plants designed to produce chemicals for medical and industrial uses.

Part III: Biotech Industry Lawsuits Against Farmers

(Text adapted from: Monsanto vs. U.S. Farmers, by the Center for Food Safety)

A 2005 report documented the extent to which American farmers have been impacted by litigation arising from the use of patented GM crops. After extensive research and numerous interviews with farmers and lawyers, CFS found that Monsanto has used heavy-handed investigations and ruthless prosecutions that have fundamentally changed the way many American farmers farm. The result has been nothing less than an assault on the foundations of farming practices and traditions that have endured for centuries in this country and millennia around the world, including one of the oldest traditions: the right to save and replant the seeds of one's crops.

Monsanto's position as a leader in the field of agricultural biotechnology and its success in contractually binding farmers to its GM seeds result from its concerted effort to control patents on genetic engineering technology, seed germplasm, and a farmer's use of its engineered seed.

Monsanto begins the process of seizing control of farmers' practices by getting them to sign the company's technology agreement upon purchasing patented seeds. This agreement allows Monsanto to conduct property investigations, and exposes the farmer to huge financial liability, binds the farmer to Monsanto's oversight for multiple years, and includes a variety of other conditions that have effectively defined what rights a farmer does and does not have in planting, harvesting, and selling GM seed.

In general, Monsanto's efforts to prosecute farmers can be divided into three stages: investigations of farmers, out-of-court settlements, and litigation against farmers who Monsanto believes are in breach of contract or engaged in patent infringement. Monsanto itself admits to aggressively investigating farmers it suspects of transgressions, and evidence suggests the numbers reach into the thousands. According to farmers interviewed by the Center for Food Safety (CFS), these thousands of investigations frequently lead to the second stage: Monsanto pressuring the farmer to settle out of court for an undisclosed sum and other terms agreed to in confidential settlements.

For some farmers, Monsanto's investigation of them will lead to the courtroom. To date, Monsanto has filed 90 lawsuits against American farmers. The lawsuits involve 147 farmers and 39 small businesses or farm companies, and have been directed at farmers residing in half of the states in the U.S. The odds are clearly stacked against the farmer: Monsanto has an annual budget of $10 million dollars and a staff of 75 devoted solely to investigating and prosecuting farmers.

The largest recorded judgment made thus far in favor of Monsanto as a result of a farmer lawsuit is $3,052,800.00. Total recorded judgments granted to Monsanto for lawsuits amount to $15,253,602.82. Farmers have paid a mean of $412,259.54 for cases with recorded judgments.

It should be noted that this information is based on data up to 2005; since that time numerous other farmers have been investigated, harassed, and been engaged with legal actions. (See Part IV for some updated information on recent legal challenges on seed patents and farmers.)

Part IV: Influence of Monsanto and Biotechnology Corporations on Government Polic

Given the failures of GM technology—increasing super weeds, increased use of pesticides, failure to increase yields—why does the U.S. government continue to have such a strong influence on GMO policy, not just at home but also abroad? One of the main reasons that many governments are opening the doors to GMOs is because of the far-reaching political, marketing, and monetary influence of giant biotech corporations.

In the U.S., the biotechnology industry influences government leaders and agencies through massive lobbying efforts, campaign contributions, and also through a "revolving door" influence wherein people working for biotech companies become government regulators, and those in government accept jobs within the biotech industry.

Top food and agricultural biotechnology firms spent more than $547 million lobbying Congress between 1999 and 2009. The firms employed more than 100 lobbying firms in 2010 alone, as well as their own in-house lobbyists. Lobbying expenditures rose 102.8 percent from $35.0 million in 1999 to $71.0 million in 2009.

In addition to lobbying efforts, the biotechnology industry made more than $22 million in campaign contributions since 1999 (via Political Action Committees, or PACs).

The "revolving door" between government and industry is spinning at a dizzying pace. Government agencies hire industry representatives from agribusiness and biotech firms and corporations recruit staff from government agencies. When it comes to GMOs, the regulated have largely become the regulators.

Below are only a few examples of former biotech company employees who also worked for food and agricultural regulatory agencies in the government.

Michael Taylor was assigned as "senior advisor" to the commissioner commissioner of the Food and Drug Administration (FDA) in 2009. Taylor has bounced back and forth between various government agencies and employment with Monsanto where he was a former vice president for public policy (a euphemism for chief lobbyist) and he also supervised a team of lawyers employed by Monsanto. He is said to have been influential in advising Monsanto in their fight against regulation of their products containing rBGH, a growth hormone administered to cows to boost up milk production.

Alison L. Van Eenennaam is former Monsanto employee who serves on the FDA Committee that sought to approve GM salmon and also serves on the USDA's heavily pro-genetic engineering Advisory Committee on Biotechnology and 21st Century Agriculture (AC21).

Roger Beachy was appointed head of National Institute of Food and Agriculture (NIFA), the main research arm of the USDA in 2009, (he has since left this post). Beach previously worked at the Danforth Plant Science Center which was founded with a gift by the Monsanto Fund. Beach is currently listed as a researcher on the Danforth website.

These are just a few examples of individuals who move seamlessly through the corridors of power in both the government and industry. Additionally, the now standard practice of biotech firms employing

former members of Congress, and Congressional and White House staff members as lobbyists gives the industry an inside track. As noted in a report by Food and Water Watch, this kind of revolving door scheme between congressional staff and corporate lobbyists allows staff to cash in on their legislative expertise as lobbyists for the industry.[10]

Role of Obama Administration

In many ways, the Obama Administration promotes GM crops more vigorously than previous administrations. The Administration views GM crops to be part of its strategy for reducing world hunger. This was emphasized by a director at the USDA at a recent Congressional hearing: "First I would like to emphasize that at USDA, we support all forms of agriculture—conventional, including the use of genetically engineered [GM] products, and organic—to meet the nation's and the world's need for food security, energy production, and the economic sustainability of farms." [11]

New York Times columnist Maureen Dowd revealed that David Axelrod, a former Obama Administration political strategist and now working on his re-election campaign, urged that the White House "plow forward" with the plan to fully deregulate GM alfalfa.

Dr. Rajiv Shah, a former employee of the Gates Foundation and now the USAID administrator, gathered with CEOs of Monsanto and Unilever to launch "Realizing a New Vision for Agriculture." Other companies involved in the initiative include grain-trading giants Archer Daniels Midland, Cargill, and Bunge; agrichemical leaders BASF, Syngenta, and Dupont; and industrial "food"/beverage titans Coca-Cola, SABMiller, General Mills, and Kraft Foods.

Part V: U.S. Regulatory Policy and Legal Challenges

Congress has yet to pass a single law intended to manage GMOs. (Although the House of Representative's recent passing of the Woolsey-Young amendment banning federal funding for GM salmon is a first step. See more on this under GM Salmon section.)

On the federal level, eight agencies attempt to regulate biotechnology using 12 different statutes or laws that were written long before GM food, animals and insects became a reality. The result has been a regulatory tangle. Among many bizarre examples of regulatory anomalies is the current attempt by the Food and Drug Administration (FDA) to regulate genetically engineered fish as "new animal drugs." Yet, at the same time, the FDA claims it has no jurisdiction over genetically engineered pet fish like the goldfish.

The regulatory system for GMOs was developed from the mid 1980s to the early 1990s during the Reagan and Bush administrations. It was decided that GM crops and foods would be regulated under existing statutes designed for invasive plants, chemical pesticides, and food additives, and that transgene technologies would not trigger any special regulatory consideration. Such a policy set the doctrine of "substantial equivalence" which maintains that GM crops and foods are no different than non-GM crops and foods. According to Henry Miller, head of the biotechnology division at the FDA from 1979-1994: "In this area, the U.S. government agencies have done exactly what big agribusiness has asked them to do and told them to do."[12]

Regulatory responsibility is summed up as follows:

- The U.S. Department of Agriculture (USDA) oversees GM crop field trials and is responsible for deregulating (i.e., permitting cultivation and sale of) GM crops.
- The Environmental Protection Agency (EPA) regulates pesticides in GM pesticidal plants

[10] http://documents.foodandwaterwatch.org/BiotechLobbying-web.pdf

[11]Testimony of Ms. Ann Wright Deputy Under Secretary for Marketing and Regulatory Programs United States Department of Agriculture. Before the Subcommittee on Domestic Policy of the House Committee on Oversight and Government Reform September 30, 2010

[12] Eichenwald, K., Kolata, G. and Petersen, M. (2001). Biotechnolog food: from the lab to a debacle. *New York Times January* 25, 2001, pp. A1, C6-C7.

and has joint responsibility with the Food and Drug Administration for selectable marker genes and proteins used in crop development.

- The Food and Drug Administration (FDA) conducts voluntary consultations on other aspects of GM foods. As noted already, the FDA also oversees GM fish in a strange anomaly through its purview over new pharmaceuticals.

The USDA regulates GM crops under two categories—"plant pests" and "noxious weeds." The plant pest standard was established because most GMOs contain genes from viruses and other organisms considered to be plant pests. Noxious weeds are a regulatory "hook" because GM crops could outcompete conventional, non-GM crops.

Under this regulatory gauge, the USDA must conduct an Environmental Impact Statement (EIS), established by the National Environmental Protection Act (NEPA), before assessing whether to commercialize a GM crop.

For a much more comprehensive review of the U.S. regulatory structure pertaining to GMOs, see Safety Testing and Regulation of Genetically Engineered Foods, W. Freese and D. Schubert which can be accessed at: www.centerforfoodsafety.org

GM Alfalfa

The USDA deregulated Monsanto's Roundup Ready alfalfa in 2005 without conducting an EIS. On behalf of a coalition of farmers, who seek the right to grow organic and conventional alfalfa without threat of genetic contamination caused by Monsanto's GM alfalfa seeds,[13] the Center for Food Safety, sued the USDA for violating NEPA by not requiring an environmental assessment before deregulating the GM alfalfa. A federal judge in a District Court ruled in favor of CFS and the farmers and ordered that GM alfalfa planting be halted pending an Environmental Impact Statement (EIS). At this juncture, Monsanto stepped into the case claiming it was an "interested party." In 2007 and 2008 Monsanto appealed the original decision in District Court but lost on both accounts.

Unhappy with such rulings, Monsanto asked the U.S. Supreme Court to hear the case and it agreed to do so in April 2010. In June the Court announced its ruling and though Monsanto technically won the lawsuit, the Supreme Court judgment upheld the ban on the commercial sale and planting of Monsanto's Roundup Ready Alfalfa until or unless the USDA conducted a thorough EIS before formally deregulating the crop.

On a quiet holiday weekend in January 2011, the USDA announced that it would allow unlimited, nation-wide commercial planting of Monsanto's GM alfalfa even though its own Final Environmental Impact Statement (FEIS) acknowledged that this would pose many serious risks to organic and conventional farmers.

[13] Kimbrell, George. Supreme Court Ruling in Monsanto Case is Victory for Center for Food Safety, Farmers

The FEIS also showed that because only 7 percent of non-GM alfalfa is treated with herbicides, a substantial adoption of Roundup Ready alfalfa would trigger large increases in herbicide use of up to 23 million pounds per year.

Astonishingly, the USDA approved the GM alfalfa despite admitting that it would contaminate non-GM alfalfa, that superweeds would be created, that higher amounts of pesticide would be used, and that non-GM alfalfa farmers would be negatively impacted by contamination. At first this admission was viewed by some to be a hopeful sign that the agency would establish restrictions to curb contamination and to address contamination when it occurred. However, the agency soon turned around and announced that there would be no restrictions.

Reports and articles emerged asserting that the pressure came directly from the White House. The *Wall Street Journal* wrote that "[t]he Obama administration Thursday abandoned a proposal to restrict planting of genetically engineered alfalfa, the latest proposal shelved as part of the administration's review of 'burdensome' regulation."

The CFS and the environmental law organization Earthjustice filed suit against the USDA, arguing that the agency's recent unrestricted approval of genetically engineered (GM), "Roundup Ready" Alfalfa was unlawful. The lawsuit alleges that the USDA's analysis of the myriad environmental, socio-economic, agricultural, and cumulative impacts of deregulating GM alfalfa is erroneous, unsupported, and/or inadequate to comply with NEPA criteria.

Additionally, a large coalition of organic food retailers and dairy associations are writing letters to government agencies and the Obama administration, supporting legal suits, and undertaking other actions to curb production of GM alfalfa.

GM Sugar Beets

The legal battle over GM sugar beets has been a fast moving ping-pong match. The battle began in 2008, when a coalition of groups sued the USDA for deregulating Monsanto's GM sugar beets without complying with the National Environmental Policy Act's (NEPA) requirement of an EIS before deregulating the crop.

On August 13, 2010, the federal court banned the crop until the USDA fully analyzed the impacts of the GM plant on the environment, farmers, and the public in an EIS. Three weeks later, despite the court's ruling, and without any prior environmental analysis, the USDA issued permits to seed growers to again grow GM sugar beets.

The coalition immediately filed suit against the USDA for allowing these illegal plantings in lieu of the court's decision. On November 30, 2010, the court found that the government and Monsanto had rushed to illegally plant GM sugar beets and ordered the removal of the GM sugar beet seedlings that were planted in violation of federal law.

Monsanto and the USDA challenged this ruling and in May of 2011 the U.S. Ninth Circuit Court of Appeals

issued a summary order in upholding previous court rulings finding the plantings to be illegal. However, Monsanto and the other seed companies then filed an emergency appeal and the Appeals Court overturned the previous judge's order to destroy the crops. Therefore, the seedling crops were not destroyed.

In February 2011, the USDA "partially deregulated" GM sugar beets. This move undermines the integrity of the regulatory process as it allows the threat of environmental harm to continue while the impacts are still being studied by the USDA. In response, the CFS is suing the USDA for the third time regarding GM sugar beets. This case is currently pending in the District Court of DC. The case should be decided early 2012.

As part of the ongoing effort to halt commercial GM sugar beets, leading organic businesses and trade groups have filed a joint brief to the U.S. Court of Appeals for the Ninth Circuit to demonstrate opposition to Monsanto in the ongoing case regarding planting of Roundup Ready GM sugar beets.

On the civil society front, hundreds of thousands of letters and comments have been sent to the USDA to express opposition to GM sugar beets. The letters let the corporations know that people want GM-free sugar and sweeteners, and warn that consumers may not purchase their products unless they vow to take a GM-free stance.

GM Bluegrass

July 2011, the USDA issued a statement that Scotts Miracle-Gro Co. (Scotts) Kentucky Bluegrass, a bluegrass variety genetically engineered for herbicide tolerance, was approved and will not be subject to agency regulation. In other words, by declining to regulate bluegrass, the crop will not be subject to environmental impact assessments or any regulatory process. The USDA ignored CFS' petitions asking that the agency regulate the GM bluegrass as a noxious weed.The USDA claimed that because Scotts did not use a plant pest to genetically engineer the bluegrass variety, the organism would not fall under regulatory authority.

The USDA also acknowledged that the GM grass will most certainly pollinate and contaminate non-GM bluegrass, and producers "will likely have concerns about the loss of their ability to meet contractual obligations." Yet, no plan is in place to assist farmers who may lose income form GM contamination.

Bluegrass has light pollen that can be carried for miles on the wind, meaning that GM bluegrass can easily transfer its genes to established conventional bluegrass. Like most grasses, bluegrass spreads rapidly. Scotts is also seeking deregulation of Roundup Ready bentgrass, another grass that has proven hard to control. In 2005, Scotts grew trial plots of its bentgrass in Oregon. It escaped the boundaries of the experimental plot and is still creating problems for homeowners miles away.

Other Legal Actions

GM Crops on National Refuges: In August 2011, a coalition of non-profit organizations including Public Employees for Environmental Responsibility (PEER), the Center for Food Safety (CFS), and

Beyond Pesticides, filed a lawsuit that seeks to end cultivation of GM crops on 25 national wildlife refuges (which are designated to be protected public lands) across southeastern U.S.

Family Farmers Legal Complaint Against Monsanto's Patent Infringement Practices: New threats by Monsanto have led to the March 2011 filing of an amended complaint by the Public Patent Foundation (PUBPAT) in its lawsuit on behalf of family farmers, seed businesses, and organic agricultural organizations—including the Center for Food Safety—challenging Monsanto's patents on GM seed.

The legal action seeks protection against any threats or lawsuits from Monsanto for claims of patent infringement against organic farms that became unintentionally contaminated by Monsanto's GM seed. Monsanto has indicated that it will sue farmers whose fields are found to have "trace elements" of their GM seeds, regardless of how the genetic material got there.

Part VI: Genetically Engineered (GM) Salmon

In fall of 2010, the Food and Drug Administration (FDA) made a surprising announcement that it would consider approving genetically engineered (GE) salmon. A broad coalition of consumer, environmental, and animal welfare groups, commercial and recreational fisheries associations, chefs, restaurants, and food retailers rapidly consolidated and stopped the commercialization of GM salmon for the moment, but expectations are that the FDA is determined to approve the fish.

The approval process was clearly intended to be completed without much public or civil society scrutiny, as the agency allowed only 14 days for public comment on its 255 page report. (The standard comment period is 30-60 days.) Doubly frustrating to many is that the FDA had been working with AquaBounty, the company seeking approval for its GM salmon, for over a decade but no one had been allowed to review any reporting documents until days before what appeared to be the company's imminent approval.

In tandem with the move to approve GM fish, the FDA scheduled a hearing to disallow labeling of any GM fish (the hearing was scheduled a day after the presumed approval for GM fish was to take place).

The GM Atlantic salmon being considered was developed by artificially combining growth hormone genes from an unrelated Pacific salmon, (*Oncorhynchus tshawytscha*) with DNA from the anti-freeze genes of an eelpout (*Zoarces americanus*). This modification causes production of a growth hormone year-round, creating a fish the company claims grows at twice the normal rate, allowing factory fish farms to crowd fish into pens and still get high production rates.

The GM salmon story is illustrative of the globalization of GM fish. According to AquaBounty, the developer of the fish, the company will raise the GM eggs in a facility on Prince Edward Island in Canada, and then it will ship those fish to be raise in a land-based facility in Panama where the fish will be grown out and the processed before being shipped for commercial sale.

Major concerns about GM salmon include the potential harmful effect on native salmon fish

populations and harmful effects on public health with respect to allergens and creating immunity to antibiotics.

The routine use of antibiotics to control diseases often found in farm-raised fish can impact human health. Some research suggests that transgenic fish may be susceptible to more diseases than fish currently grown in aquaculture facilities.[14] Consequently, the amount of antibiotics given to transgenic fish may be higher than the amount currently given to farmed fish. Already farmed salmon are given more antibiotics by weight than any other livestock. Eating farmed fish treated with antibiotics could be harmful to humans. Indeed, some antibiotics are toxic and can even cause fatal allergic reactions.[15] Additionally, the use of antibiotics in aquaculture also exacerbates the significant problem of antibiotic resistance in humans (as well as animals).

Another concern is that GM fish pose serious risks to wild populations of fish, and to consumers who rely on them for healthy nutrition. Each year millions of farmed salmon escape from open-water net pens outcompeting wild populations for resources and straining ecosystems. Even in land-based facilities salmon have the ability to escape and will be virtually impossible to recover.

Escaped GM salmon can pose an additional threat – genetic pollution resulting from what scientists call the "Trojan gene" effect. Research published in the *Proceedings of the National Academy of Sciences* notes that a release of only 60 GM fish into a wild population of 60,000 would lead to the extinction of the wild population in less than 40 fish generations. In a 2003 Biological Opinion for the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service (FWS) along with the National Oceanic and Atmospheric Administration (NOAA) expresses concern that transgenic salmon would threaten and adversely affect wild Atlantic salmon, which are currently on the Endangered Species List. The report concludes: "…"[t]he prohibition on the use of transgenic salmonids at existing marine sites off the coast of Maine will eliminate the potentially adverse disease and ecological risks posed by the use of transgenic salmonids in aquaculture. Even growing the fish on land may pose ecological problems."
The GM salmon issue has caught the attention of Congress. An amendment was passed by the House of Representatives (the Young-Woolsey amendment) that bars the FDA from using funds in the 2012 fiscal year to approve GM salmon. The amendment is up for review in the Senate (an amendment becomes law only when both the House and the Senate give approval).

The mounting Congressional opposition to the GM salmon has opened the doors to discussion on part of the U.S. regulatory process for GMOs. The FDA, historically created to regulate pharmaceuticals announced in 2009 that it would regulate GM animals as animal drugs. This regulatory process is now being reviewed for the first time by Congress.

Part VII: Economic Profile of Monsanto

In 2009, *Forbes* named Monsanto Company of the Year; on October 12, 2010, *Forbes* reporter Robert

[14] William Muir et al., Possible ecological risks of transgenic organism release when transgenes affect mating success: Sexual selection and the Trojan gene hypothesis, 96 PNAS 13853-13856, at 13853 (Nov. 23, 1999).
[15] Rebecca Goldberg and Tracy Triplett. Murky Waters: The Environmental Effects of Aquaculture in the U.S. (p 44). Environmental Defense Fund (1997).

Langreth wrote "*Forbes* Was Wrong On Monsanto. Really Wrong." The reasons causing such a shift in analysis stem from a laundry list of Monsanto's financial woes, legal battles, and public affairs deception. According to *Forbes*, Monsanto's economic growth years may be a trend of the past.
Monsanto's company shares hit a peak in 2008 followed by a period of volatility in share prices and trading volume. The current year, however, has shown significant declines in share volume, by approximately 40 percent, since a peak in January 2010.[16] Echoing *Forbes'* correction of its misread of Monsanto, another stock market commentator, Jim Cramer, dubbed it the "worst stock of 2010."[17]

These downhill turns for Monsanto coincide with a trend of product failures and customer disappointment which include the growing superweed epidemic. Other downturns for Monsanto in 2010 included:

- The genetically modified (GM) SmartStax corn, the company's newest seed, failed to increase yields beyond the company's previous and less expensive seed varieties.[18]
- The company's most recent innovation in soybean seeds, Roundup Ready 2 Yield, is facing scrutiny from farmers and government bodies. The state of West Virginia is investigating the failure of the soybeans to yield the advertised 7-11 percent increase. Monsanto's failure to cooperate with the investigative probe has led the State's Office of the Attorney General to request a court order to prohibit Monsanto soybean sales in West Virginia until the company complies with the subpoena.[19]
- To appease its target market and investors, it announced price cuts for both corn and soybean seeds in August 2010. Almost certainly related to these price cuts is the upcoming (2014) expiration of Monsanto patent life cycle for the first Roundup Ready soybean seeds. This patent expiration will allow cheap generics into the US market by 2014.[20] The company also lowered pricing in early 2010 on its Roundup herbicide to compete with less expensive glyphosate generics that have been steadily entering the market (largely from China) since Monsanto's patent rights on glyphosate expired in 2000.[21]

In late summer 2011, Monsanto's stock tumbled nearly 4 percent after a report was published about rootworms that are developing resistance to a Bt corn variety. While Monsanto claimed that the corn had "tremendous performance" against the rootworms in 99 percent of acres on which it is planted, the emerging resistance, mainly in Iowa and Illinois, could cause farmers to switch to seeds sold by competitors.

Monsanto claims that its total seeds and traits revenue rose to $2.65 billion from $2.36 billion last year, and corn seed sales jumped 10 percent from last year to $1.12 billion.
Monsanto's economic volatility during the last few years seems to imply mounting skepticism over GM technologies. This, combined with a series of increasing weed and insect resistance, outright failures of GM crops, and competition from other corporations as Monsanto patents expire, provide further

[16] Langreth, Robert. "Monsanto Shares Get a Shakedown. Is the Worst Still to Come?"
[17] Pollack, Andrew. "After Growth, Fortunes Turn for Monsanto."
[18] Pollack, Andrew. "After Growth, Fortunes Turn for Monsanto."
[19] West Virginia Attorney General Press Release
[20] Agrimoney "Monsanto faces revenue risk if seed drive misfires"
[21] Kilman, Scott. "Monsanto cuts roundup prices as knockoffs flood farm belt."

points of leverage to mobilize civil society, farmers, consumers, and investors to reassess this failed technology.

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A. The Americas

MEXICO
Genetically Modified Corn at its Center of Origin

*Ana de Ita, Centro de Estudios para el Cambio en el Campo Mexicano**

In Mexico, the debate over the cultivation of genetically modified organisms (GMOs) has centered on corn. Corn is the country's most important crop, the
core of peasant agricultural production and organization, the staple of the popular diet, the most widely consumed grain, and the heart of the culture. It is also considered part of the human heritage; in Mesoamerican creation stories, the human race was modeled out of cornmeal, not clay.[22]

Mexico and Mesoamerica are where corn originated and diversified into the varieties of today. Maize cultivation was the grand achievement of Mesoamerican civilization. Mexico leads all nations in its wealth of landraces and varieties[23]; there are more than 60 landraces and thousands of native varieties, as well as varieties of the wild ancestor of the grain called "teocintle." [24]

The corn plant reproduces by cross-pollination, unlike other basic grains like wheat and rice that are self-pollinated. When corn reproduces, the pollen of one plant pollinates neighboring plants, and all the plants in a cornfield will be different from the previous generation and from each other.[25] Under favorable conditions pollen can travel long distances and still be effective for fertilization. Therefore, it's inevitable that genetically modified (GM) corn will contaminate native corn. As a recent study puts it: "…it is very easy to insert new genes into the system, but very difficult—if not impossible—to eradicate them." [26]

Although many other crops are also genetically diverse, corn is remarkable for the genetic diversity found in a single plot. It is common to find three or four or even more varieties of corn together in a field. Seed selection and seed exchange among small farmers is a fundamental part of this process; there is constant flow of genetic material between communities and geographic regions as a result.
Corn is the basic food of Mexico. The consumption of corn by the Mexican population is one of the highest in the world and most people object to having a diet based on GMOs. For Mexicans, corn is also the heart of the culture and maize seed is a legacy of the ancestors. Defense of corn is a defense of

[22] Hernández Navarro Luis, "En defensa del maíz", *La Jornada*, enero 2002
[23] CIMMYT, INIFAP, CNBA, *Flujo genético entre maíz criollo, maíz mejorado y teocintle: implicaciones para el maíz transgénico*. Memoria del Foro. México, September 1995. p. 105
[24] In the Western Hemisphere there are between 220 and 300 races of maize (Brown and Goodman, 1977; Vigouroux *et al.* 2008; in Mexico, according to different authors and institutions there are between 41 and 65 races, see 41 (Ortega-Paczka *et al.* 1991), 59 (Sánchez *et al.* 2000) or 65 (LAMP, 1991) cited in: Kato Ángel, Cristina Mapes, *et.al*., *Origen y diversificación del maíz. Una revisisón analítica*, México, UNAM, Instituto de Ecología, UACM, CP, Semarnat, Conabio, 2009.
[25] CIMMYT, "Assessing the Benefits of International Maize Breeding Research: An Overview of the Global Maize Impacts Study" in: *World Maize Facts and Trends,* CIMMYT 2000 p. 26
[26] Serratos J.A., Islas F. and J. Berthaud, "Producción de maíz, razas locales y distribución del teocintle en México: Elementos para un análisis GIS de flujo genético y valoración de riesgos para la liberación de maíz transgénico", paper presented in Brasilia, forthcoming, 2001

personal, collective, and national identity. It is perceived as a shared struggle and an obligation derived from the country's history.

NAFTA—The Vehicle Of GM Corn Into Mexico

Following passage in 1994 of the North American Free Trade Agreement (NAFTA) corn imports increased exponentially from just 154 thousand tons in 1993, to 5.6 million tons in 1996. As a result, incomes of the 3.2 million corn producers, the majority of the small-scale producers in the country, dramatically dropped. Between 1993 and 2006 Mexican producer prices dropped by 50 percent, pressured by imports without tariffs. [27]

The increase in imports was not due to a lack of production in Mexico —corn production has increased and currently stands at over 20 million tons. For several years prices paid for imported corn were higher than prices paid for Mexican corn. The heart of the matter can be found in the support programs for agricultural and livestock exports that the U.S. government provided to its producers through the Commodity Credit Corporation (CCC). Through this program corn importers could obtain long-term soft loans. Importing grain became a profitable financial operation. Mexico is the second largest export market for U.S. corn. The source of the native corn transgenic contamination was imports of corn from the United States without segregation or labeled.

Corporations, Scientists, and the Mexican Government

The Mexican government actively promotes GM corn, acting in favor of the corporations that produce GM seed and against the popular will. Both houses of Congress have passed laws that undermine the public good and resources to favor corporate interests. Among these are the Biodiversity and Genetically Modified Organisms Law (2005) - popularly known as the Monsanto Law and the Law of Seeds[28] (2007) - which seeks to make the exchange and marketing of peasant seed illegal.

The debate on GMOs has placed the government and private companies in opposition with society, especially indigenous and peasant communities and organizations, independent scientists, environmental and civil organizations and a growing number of citizens.

The analysis of the risks of GM corn for the diversity of landraces and varieties of native corn in the center of origin began among scientists at public research institutes. At first, study and debate was limited to a handful of specialists. In 1995, national and international maize specialists pointed out that "if GM corn is deregulated in the United States, it is very probable that it will get to Mexico in a short period of time."[29] In 1998, the corporations that produce GM seed increased the pressure on the Mexican government to allow experimental plantings on several hectares. Some scientists from the National Council of Agricultural Biosecurity charged with approving permits for sowing, proposed a *de facto* moratorium on experimental and commercial cultivation of GM corn. The moratorium went into effect in 1999 and was in place until 2009.

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[27] (de Ita Ana, *Fourteen Years of NAFTA and the Tortilla Crisis*, Americas Program Special Report, January 2008).

[28] Ley Federal de Prioducción, Cerificación y Comercialización de Semillas 2007.

[29] CIMMYT, INIFAP, CNBA, *Op. Cit.* , 1995.

Moving quickly in the opposite direction, the Mexican government has not done anything to stop the entry of GM corn and other crops into the country and instead has promoted them.

In November of 2001 two scientists working at the University of California, Berkeley — Ignacio Chapela and David Quist — found native corn varieties contaminated with transgenes in some parts of the Sierra Norte of Oaxaca and Puebla.[30] The biotechnology industry, behind scientist members of the AgBioWorld electronic discussion group moderated by biotechnology professor CS Prakash, led a campaign to discredit both the scientists and their findings successfully pressured *Nature* magazine to retract the publication of Chapela and Quist's findings.[31] However, the Mexican National Ecology Institute and National Commission on Biodiversity (Conabio) confirmed the existence of GM contamination in native corn in their own analyses. They also discovered that the governmental food program Diconsa in Ixtlán, Oaxaca, had found GM contamination of corn destined for human consumption.[32]

Corn imported from the United States was the source of the native corn contamination. Following the passage of the North American Free Trade Agreement (NAFTA), imports increased exponentially. Mexico is the second largest export market for U.S. corn, but the Mexican government has never required GM corn to be segregated or labeled.

Diconsa, a state-run agency for public food supply in rural zones, distributed imported corn in 23,000 rural stores. In some places, farmers planted this corn and the cultivation of imported GM corn contaminated native varieties.[33] Mexico imports more than eight million tons of corn annually — nearly all from the United States. By 2010, 86 percent of all U.S. corn produced was genetically modified.[34]

In 2003 the Mexican government signed an agreement with the United States and Canada to remove the requirement that cross border shipments of grain contain less than five percent genetically modified material.[35] At the meeting of the Cartagena Protocol in Kuala Lumpur in 2004, the Mexican government blocked consensus on a requirement to label GM products, as a favor to the U.S. government.

The North American Commission on Environmental Cooperation (CEC) did a study on the implications of sowing GM corn in Mexico at the request of several grassroots organizations.[36] Among

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[30]Chapela I., Quist D., "Transgenic DNA introgressed into traditional maize landraces in Oaxaca, Mexico", in: *Nature,* vol. 414, November 29, 2001. p. 541-543

[31] George Monbiot, "The fake persuaders. Corporations are inventing people to rubbish their opponents on the internet", The Guardian, 14 May 2002. http://www.guardian.co.uk/politics/2002/may/14/greenpolitics.digitalmedia#history-link-box

[32] INE, Conabio, *Evidencias de flujo genético desde fuentes de maíz transgénico hacia variedades criollas*, enero 2002. The National Ecology Institute and the National Commission for the use and Conservation of Biodiversity are agencies under the Environmental Ministry.

[33] de Ita, Ana, "Diconsa en la contaminación transgénica del maíz nativo," en: *La Jornada*, March 16, 2002

[34] United States Department of Agriculture, Economic Research Service
http://www.ers.usda.gov/Data/BiotechCrops/ExtentofAdoptionTable1.htm

[35] "Requisitos para la documentación de organismos vivos modificados para alimento humano o animal o para procesamiento"

[36] Ver *Infra.* 22 indigenous communities, among which 15 were found with GM-contaminated corn, carried out by GreenPeace, UNORCA, Ceccam, Cenami.

its main conclusions was that the Mexican government should *strengthen* the moratorium on the commercial planting of GM corn, and minimize the imports of GM corn capable of reproducing. It also recommended doing a scientific analysis of the effects of GM corn on health, given that the *per capita* consumption of corn by Mexicans is extremely high. The Mexican government ignored these recommendations and moved in the other direction by promulgating the 2005 Biosecurity and Genetically Modified Organisms Law that places the interests of business to sell patented GM seed in Mexico over concerns for the common good.

The Biosecurity Law was the instrument used to lift the moratorium on experimental and commercial planting of GM corn in Mexico. This law establishes three steps toward cultivation of GM organisms for commercial use: 1) a period of experimental cultivation, 2) a pilot project and, 3) the receipt of a permit for a company or farmer to cultivate commercially.

On March 9, 2009, Mexican President Felipe Calderon decreed the end of the *de facto* moratorium that had prohibited the experimental or commercial production of GM corn in Mexico since 1999. His decision came shortly after a meeting with the president of Monsanto Corporation in Davos, Switzerland. The decree gave the go-ahead to companies to apply for permission to sow GM corn in various parts of the country.

At the same time, the Mexican government also reformed the Law on Seeds in 2007.[37] This law follows the international tendency to promote the use of commercial hybrid seed, controlled by a small group of powerful transnational companies, by making peasant farmers' seeds illegal.[38] In Mexico, 75.3 percent of agricultural producers plant their own saved seeds.[39]

Several government programs actively promote the use of hybrid seed, leading to the loss of peasant seed varieties. For example, according to one scientific study, between 1996 and 2001 the program Kilo by Kilo gave out corporate corn seed that could very possibly have been genetically modified despite the continuing moratorium.[40] The government support program for small-scale producers of beans and corn (PROMAF is its Spanish acronym) pushes the use of hybrid seed and chemical fertilizers.

The Status of GMOs in Mexico

Mexico is the place of origin for more than one hundred cultivated plants, such as tomato, cotton, and corn--all crops that now have GM varieties.

Tomatoes

Although Mexico is considered, along with Peru, to be the center of origin and domestication of tomatoes, the GM variety known as *Flavr Savr* produced by the Calgene company(later bought up by Monsanto), was the first GM crop released from regulatory constraints and opened up for commercial

[37] Ley Federal de Producción, Certificación y Comercio de Semillas, **(**2007**)**
[38] Ceccam, Red En defensa del maíz, *Las semillas del hambre: ilegalizar la memoria campesina*, México, 2009
[39] INEGI, Censo Agropecuario, Mexico, 2007
[40] Álvarez Buylla, Elena, Ed., *Dispersal of Transgenes through Maize Seed Systems in Mexico,* PlosOne, 4(5): e5734. doi:10.1371/journal.pone.0005734. 2009

cultivation in 1996. It was not popular on the international market and producers soon changed to the non-GM variety *Divine Ripe*.

Cotton

Experimental plantings of GM cotton began in 1995. Cotton is native to Mexico and has been cultivated for centuries, but companies argued that in the northern region of the country there are no native varieties that could potentially be contaminated. They sow their GM crops in these areas, which are zones of industrial agriculture and modern irrigation systems.

GM cotton covers the greatest land area of all GM crops in Mexico and is located in nine northern states. Between 1996 and 1999 the land area authorized to Monsanto for production of GM cotton expanded to 83,799 hectares. The Center for Study of Rural Change in Mexico (Ceccam) carried out a field study and discovered that the Mexican government's "Alliance for the Countryside Program" explicitly subsidizes 45 percent of the value of the GM seed purchased and the royalty payments to Monsanto. GM cottonseed is 25 percent more expensive than non-transgenic seed and license cost US $80 per hectare. The Mexican government subsidized Monsanto with 45 percent of the value of these inputs between 1998 and 2001.[41]

Corn

The moratorium on the experimental and commercial sowing of GM corn was lifted by presidential decree in March 2009. Between 2009 and March 2011, Monsanto, Dow AgroScience, Pioneer Hi-Bred International, and Syngenta, have all together requested 110 permits to plant GM corn in the northern states of Sonora, Sinaloa, Chihuahua, Tamaulipas, Coahuila, Durango, Nuevo Leon and even Jalisco. Of these, 67 have been approved for experimental cultivation on nearly 70 hectares and the rest of the requests are still being evaluated.

Monsanto and Pioneer-Dupont solicited 11 permits for pilot plantings of GM corn in Sinaloa, Coahuila, Durango, Tamaulipas and Chihuahua. On March 8, 2011, the Ministry of Agriculture issued the first permit for a pilot planting of GM corn to Monsanto. The permit covers a planting of the MON 603 variety of yellow corn on less than a hectare of land in Tamaulipas. The Ministry is in the process of analyzing other requests for pilot plantings. This process brings the country much closer to open commercial cultivation.

Since 1996 the Mexican government has promoted programs to restore cultivation of soybean and rapeseed using GM varieties in states in the north and southeast.

Grassroots resistance against GM Crops

Mexican peasant and indigenous farmers have been the main actors in the resistance to GM crops, along with independent scientists and some non-governmental and environmental organizations.

Scientists who anticipated the dangers helped establish the *de facto* moratorium in 1999 on experimental

[41] Ana de Ita, "Alianza para Monsanto", en: La Jornada, 1 de junio, 2002.
http://www.jornada.unam.mx/2002/06/01/020a2pol.php?origen=opinion.html

and commercial cultivation of GM corn in Mexico. They organized scientific seminars, and participated in international forums organized by civil society to publicize the importance of maintaining the origin and diversity of native varieties, and to highlight that it is impossible for GM corn to co-exist with conventional corn without contamination. These scientists were key in the detection of transgenic contamination in communities of the Sierra Juarez of Oaxaca.

Some scientists helped Ceccam and grassroots organizations by providing specialized knowledge to carry out tests to detect GM contamination. They also did their own analyses and proved that the contamination was much more extensive than the Mexican government had admitted. Several participated in the study coordinated by the North American Commission for Environmental Cooperation (2004).

The 2002 Conference of Pugwash, organized by the Institute of Ecology UNAM, was dedicated to the analysis of the risks of GM crops. The conference concluded that "our current knowledge is insufficient to evaluate the risks and benefits of genetically modified organisms (GMOs), particularly in light of the short and long term consequences that these technologies could imply for the biosphere and future generations." In a specific reference to corn, the report notes: "Since many of the short and long term consequences of GMOs are unknown, certain activities should not be carried out until more is known about the biological and social consequences. For example, current efforts to develop corn that produces non-edible chemicals and pharmaceuticals are of grave concern, since corn is a basic food crop widely cultivated and openly pollinated."[42]

Many prominent scientists analyzed the Biosecurity Law and published their conclusions, demanding acknowledgement of the precautionary principle and criticizing the bias in favor of the biotech industry. A large number of scientific studies have been published calling on the government to maintain the moratorium on sowing GM corn. In 2006 a group of scientists in Mexico formed the Union of Concerned Scientists-Mexico that has become an important point of reference on the issue of GM corn.

The USC participated in the public consultation on the first requests for permits for experimental plantings of GM corn, bringing in technical arguments. They also supported the debate on the importance of maintaining crop diversity. Scientists have cited the recent collections of landraces and native varieties of corn to stop the advance of the pilot plantings in Sinaloa (2011). The USC has been a source for informing the public and counterbalancing the widely publicized views of scientists on the payroll of the corporations.

Indigenous and Peasant Opposition

In the summer of 1998, small farmers belonging to the French Peasant Confederation and Via Campesina, among them José Bové, held an action in France against Novartis GM corn. The action was held in solidarity with Mexican peasants, the heirs of the ancestral farmers who domesticated corn. The news spread to Mexican farm organizations.

[42] Ribeiro Silvia, "Científicos demandan una moratoria total a los transgénicos", Mexico, June 2002

Peasant organizations linked to the international movement *Via Campesina*, especially the National Union of Regional Autonomous Peasant Organizations (UNORCA, by its Spanish initials) and Ceccam, organized a workshop in 1998 to train farmers on GMOs. Arnaud Apoteker, an activist in the French peasant movement, taught the course. They also organized a public conference with the attendance of Vandana Shiva of India, who spoke about Indian peasants committing suicide because of the debt they have accrued growing *Bt* cotton. Mexican civil society began to take interest and peasants began to learn about the impacts of GM crops. In 1999, during the Ministerial Meeting of the World Trade Organization in Seattle, Mexican organizations participated with Via Campesina in demonstrations against GMOs and repressive intellectual property laws.

The National Indigenous Congress and the Zapatista Army of National Liberation took up the problem of GMOs and biodiversity as part of their defense of territory and of the rights of indigenous peoples. In 2001 they invited José Bové to participate in the "Color of the Earth March," which linked the indigenous movement with the international peasant movement and again turned attention to the problem of GMOs.

The findings of Quist and Chapela regarding native corn contaminated with transgenes in the Sierra Norte of Oaxaca in 2001 catalyzed the organization of the grassroots opposition and the integration of new communities, organizations and sectors in the *In Defense of Corn Network*, during an international meeting in January 2002.[43]
Network members discussed the threats to corn, small farmers, biodiversity and to the maize-centric culture by transgenic contamination of native maize varieties, economic liberalization and the lack of policies to promote rural economy. They united citizen efforts to oppose the importation of U.S. GM corn; to organize campaigns for agricultural policies based on the principle of food sovereignty; to recognize struggles for the autonomy, territory, and the rights of Indian peoples; and to acknowledge the demands and concerns of environmental and rural development organizations, and scientists. The broad-based group declared:

- *Maize is the heritage of humanity, a result of the labor of Mesoamerican indigenous peoples to domesticate the plant for more than 10,000 years and not of the laboratories of transnational corporations.*
- *GM contamination of native varieties of maize damages the genetic memory of traditional Mexican agriculture, possibly irreparably.*
- *Agriculture and trade policies undermine national corn production, the backbone of the rural economy and of the organization of rural producers, and work against food sovereignty.*
- *Maize is the heritage of the Indian peoples of Mexico. Maize cultivation is the heart of community resistance.*
- The main demands and proposals of the Network in Defense of Maize were:
- Maintain and make legally binding the *de facto* moratorium that prohibits the deregulation of commercial or experimental cultivation of GM corn.

[43] *Network* i*n Defense of Maize,* proposals and demands of the I and II forums "In Defense of Maize", held in Mexico City on January 23 and 24, 2002 and December 4-6, 2003.

- Immediately suspend imports of GM corn from the United States. Imports are the principal source of contamination of indigenous corn varieties.
- Declare corn a strategic resource of national security and establish policies of protection and promotion.

The forums proclaimed, "We hold the multinationals that produce genetically modified organisms responsible for the contamination, especially Monsanto, Syngenta, Bayer, Dupont, Dow, BASF, and we reject their lawsuits for the unauthorized use of a patent, which represent an attack on our rights as farmers."[44]

The National Indigenous Congress demanded an indefinite government moratorium on the introduction of GM corn and rejected any extension of intellectual property laws that allow the private appropriation of biodiversity and knowledge (traditional or not).[45]

In October 2003, representatives of indigenous and peasant communities from Oaxaca, Puebla, Chihuahua, Veracruz, Jalisco, Durango, and the organizations Ceccam, Cenami, ETC Group, Casifop, UNOSJO y AJAGI released the results of the tests on GM contamination of peasant corn. It found that native corn varieties were contaminated in nine states. In 18 of the 104 communities sampled, between 1.5 and 33.3 percent of the samples registered positive results for the presence of transgenes.[46] In the states of Oaxaca and Chihuahua some deformed plants were found that registered the presence of two or more transgenes.

The Mexican government chose to ignore the findings of the organizations. Led by the ETC Group (Erosion, Technology, and Concentration), an international campaign resulted in a letter to the Mexican government. Signed by 302 organizations from 56 countries, the letter demanded action to stop the contamination and prevent further contamination in centers of crop origin and diversity.[47].

In some cases, the affected communities denounced the government's irresponsibility. In others, they held purification rituals for the maize and its farmers; in others, they danced and organized ceremonies. All reflected on the problem and sought collective solutions. They know that to defend maize is to defend life, their sense of community and their rights as peoples.

Indian peoples showed their determination to defend maize, the sacred sphere in which it is venerated, the ancestral knowledge that brought it into being, and the autonomy that sowing corn for their family's consumption gives them. They joined this struggle along with the struggle for defending other resources such as water, forests and territory, and their many projects for sustainable development and community development.

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[44] Red En defensa del maíz, propuestas y demandas del I y II foro "En defensa del maíz", realizados en la Ciudad de México el 23 y 24 de enero del 2002 y el 4, 5 y 6 de diciembre del 2003.
[45] Declaration of the National Indigenous Congress in the Forum "In defense of traditional medicine, San Pedro Atlapulco, September 2002, published in: *La Jornada*, Mexico, Sept. 17, 2002
[46] Ceccam, "Maíz Transgénico" in: *Sembrando Viento* No. 5, Mexico, 2006
[47] ETC Group, *Open letter from international civil society organizations on transgenic contamination in the centers of origin and diversity*, November 2003

Alongside the Network in Defense of Maize, organizations in Mexico have carried out dozens of forums, conferences, and meetings; written articles in the press; held community workshops and exchanges with other organizations; invited experts, scientists, activists, and farmers from many countries to inform public opinion on the risks of GM crops and the problem of GM contamination of native corn.

The lack of response from the government and its responsibility in the GM contamination and the advance of GM crops obliged the communities and organizations of the Network in Defense of Maize to take up the defense of maize themselves. Tactics shifted from demands on an unhearing government to community-run programs to protect native corn and resist the infiltration of GM varieties throughout the country.

In the same way that European peasants have declared GMO-free regions, indigenous and peasant communities in Mexico decided to defend their lands from the infiltration of seed from outside by advising local producers of the importance of not sowing unknown seed, not accepting seed distributed by the government, recovering their native varieties, selecting seed from their own harvests, as well as observing the cornfields and eliminating plants that appear odd or deformed and sharing their observations with other communities.
Also they decided to take advantage of the strength that comes from the ejido (collective farms) and called for a consensus to declare in GMO-free ejidos and communities. In some cases ejido rules and community statutes have established a prohibition on sowing GMOs. Some have sought to make neighboring communities aware of the threat of GM contamination and to build a regional defense against the introduction of GMOs.

On the positive side, many communities are recognizing the value of their own seeds. Faced with laws that prohibit marketing, circulation, and exchange of non-commercial seeds (essentially making native seed illegal) they have worked to identity the different varieties and landraces of maize in the region and to promote cultivation of these varieties. They have revived planting rites and the myths around maize. They have promoted regional fairs to exchange seeds, which include conferences and debates and celebrations with regional dishes cooked with locally produced ingredients.

The members of the Network also have organized and participated in national and international forums to share their experience in the defense of maize, to denounce the government's attitude and the advance of GMOs, to express their demands and to reaffirm their identity. They have organized alternative forums in alliances with the Via Campesina and the National Assembly of Environmentally Affected Communities. They have invited international allies and experts to speak.

In 2010 the Network organized the forum GMOs Rob Us of Our Future that was held parallel to the FAO meeting on Biotechnology for Countries of the South. They also participated in the Global Forum organized by Via Campesina and the National Assembly of Environmentally Affected Communities during the COP 16 Climate Change Conference in Cancun, with the slogan: "GMOs

Heat Up the Planet, Peasant Agriculture Cools Down the Planet" and presented studies on GMO contribution to global warming of industrial agriculture (2010).

Members of the Network and others participated in demonstrations against the Consultative Group on International Agricultural Research (CGIAR) for its negligence and lack of action in the case of GM contamination. They also organized in front of the headquarters of the Commission on Environmental Cooperation to receive the results of the studies on the effects of GM corn in Mexico (2004). They also attended the alternative conference parallel to the meeting of the Working Group on the Cartagena Protocol on compensation for damages (2008), in meetings of the COP in Bonn, and in the meeting held in Curitiba, Brazil, in favor of maintaining the international moratorium on the Terminator technology (2006).

They have also been invited by partner organizations against GMOs in many parts of the world and have established close ties with organizations of the Via Campesina in different countries, sharing strategies and forms of struggle and organization.

A new stage of struggle

The end of the 2009 moratorium on cultivating GM corn caused a strengthening of civil defense and multiple public forums and initiatives. People became eager to find out more about GMOs since GM corn has received permission for experimental planting.

The Network in Defense of Maize issued a declaration, "NO to GM Maize in Mexico!," which was signed by 769 organizations and thousands of individuals from 56 countries and included famous scientists, activists, and politicians, and people throughout Mexico. The declaration was publicized in the media and delivered to the Ministry of Agriculture, the FAO, and the Convention on Biological Diversity.

Via Campesina of North America decided to focus its campaign against transnationals corporations on Monsanto and promoted a "Kick-Out Monsanto; No to GM Maize" campaign. Accompanied by representatives of peasant organizations from Canada and the United States, as well as members of the Network in Defense of Maize, it organized massive forums in many regions of the country and the information reached thousands of small corn producers. Some communities painted walls and strung up banners rejecting GM maize.

The experience of small farmers from the United States and Canada where GM crops have been grown for over a decade demonstrated decisively that they do not increase yields, and in fact sometimes reduce them. Also, GM seeds do not reduce the costs of production because the seed and licenses are more expensive than conventional or indigenous seeds and they require a technological package that contains many expensive chemical inputs. They also don't reduce the use of pesticides, rather they increase them and so are not beneficial to the environment. Studies also show risks to human health. Finally, GM maize invariably contaminates native maize.

Indigenous and peasant farmers' organizations and communities know that their struggle is a global struggle against the transnational corporations and the governments that support them and that the solutions come from the people. To build and promote bottom-up solutions they count on civil society allies in other countries.

In Mexico, along with their ally Via Campesina, who is re-launching their international seed campaign, the Network In Defense of Maize plans to intensify efforts to stop the advance of GM maize into its center of origin, protect their native varieties, and continue to strengthen their communities and their identity as "peoples of maize."

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A. The Americas

LATIN AMERICA
Green Desert

*Carla Poth, Red pro una América Latina Libre de Transgénicos (RALLT)**
GE Free Latin America Network

Argentina was the first country in South America to introduce genetically modified seeds. GMOs, predominantly in soy, currently occupy most of the region's agricultural production, making the *United Republic of Soy* a reality - which is what multinationals where hoping for. However, even though soy is now one of its main exponents, this is just part of a production model with terrible consequences for a large majority of social sectors. The countries of our region are now becoming producers and exporters of *commodities*, taking advantage of their economic specialization thus loosing the opportunity to lead the way towards food sovereignty for the people. Moreover, they are actively shifting from this direction, establishing the necessary regulation frameworks for the speedy release of GM seeds, while modifying the regulations related to the intellectual property and use of the seeds.

Release events, legislation and debates

Argentina

In 1991 the National Advisory Committee for Agricultural Biotechnology (CONABIA) was created through the 124/91 Resolution of the Department of Agriculture (SAGPyA). The CONABIA was constituted with members of both the public and private sectors, and it developed into an advisory and technical support organization for the formulation and implementation of regulations concerning the deregulation, production and marketing of GMOs. The production and marketing of RoundupReady soy was deregulated in 1996. The following year, isolation measures were implemented. Just recently, in 1999, the SENASA was included in the deregulation process, in order to evaluate the impact of GMOs on the health of humans and animals.

The regulation framework used for the release of GMO involves three stages of risk assessments that require their respective opinions. To begin with, the SAGPyA authorizes the release as long as there is proof that the GMO/event does not generate significant modifications in the environment. Secondly, the SENASA analyses the suitability of this GMO for human and animal consumption. Finally, the National Department of Agriculture and Food Markets analyses the impact of GMO releases in the international market.

The current regulation for GMO releases is:

GMO RELEASE	Resolution N° 39	2003	National	Current norm for the introduction and release in the environment of plants obtained through genetic engineering. It is guided by the concepts of substantial equivalence.
GMO RELEASE	Resolution N° 226	1997	National	Establishes the isolation distances.
GMO RELEASE	Resolution N° 412	2002	National	Establishes requirements to evaluate the effect of GMO on food. Includes the Senasa.
GMO RELEASE	Resolution N° 60	2008	National	Regulates GMO experimentation with multiple events.

As of 1999, with seven releases in the field and five GM cells ready for marketing, new individuals joined the debate putting pressure on the proposal for a bill that would regulate the

genetic manipulation process, establish labeling measures for products derived from GMOs and, with the approval of the PCB, include a Safety Law on Modern Biotechnology. Argentina never ratified the Protocol, though it does participate in the Miami group negotiations.

Events currently released for marketing

Species	Characteristic introduced	Transformation event	Petitioner	Year
Soy	Tolerant to Glyphosate	40-3-2	Nidera S.A	1996
Corn	Resistant to Lepidoptera	176	Ciba- Geigy S.A	1998
Corn	Tolerant to Glufosinate ammonium	T25	AgrEvo S.A	1998
Cotton	Resistant to Lepidoptera	MON 531	Monsanto Argentina S.A.I.C	1998
Corn	Resistant to Lepidoptera	MON 810	Monsanto Argentina S.A.I.C	1998
Cotton	Tolerant to Glyphosate	MON 1445	Monsanto Argentina S.A.I.C	2001
Corn	Resistant to Lepidoptera	BT 11	Novartis Agrosem S.A	2001
Cotton	Tolerant to Glyphosate	NK 603	Monsanto Argentina S.A.I.C	2004
Corn	Resistant to Lepidoptera and tolerant to Glufosinate Ammonium	TC 1507	Dow Agroscience S.A y Pionner Argentina S.A	2005
Corn	Tolerant to Glyphosate	GA 21	Syngenta Seeds S.A	2005
Corn	Tolerant to Glyphosate and resistant to Lepidoptera	NK 603x810	Monsanto S.A.I.C	2007
Corn	Resistant to Lepidoptera and tolerant to Glufosinate Ammonium and Glyphosate	TC1507xNK603	Dow Agroscience S.A y Pionner Argentina S.A	2008
Cotton	Resistant to Lepidoptera and tolerant to Glyphosate	MON 531 x MON1445	Monsanto Argentina S.A.I.C	2009
Maíz	Tolerant to Glyphosate and resistant to Lepidoptera	BT 11xGA21	Syngenta Agro S.A	2009
Maíz	Tolerant to Glyphosate and resistant to Coleoptera	MON 88017	Monsanto S.A.I.C	2010
Maíz	Resistant to Lepidoptera	MON 89034	Monsanto S.A.I.C	2010
Maíz	Tolerant to Glyphosate and resistant to Lepidoptera and Coleoptera	MON89034xMON888017	Monsanto S.A.I.C	2010

As of the 1990s, parallel to the introduction of genetically modified organisms in the country, the laws that regulate intellectual property on seeds were modified, also to reassure investment companies. In general terms, intellectual property rights on seeds in Argentina are based on two legislations. On one hand, the *Law on Seeds and Fitogenetic Creations,* officially enacted for the first time in 1973 and regulated with amendments through decrees set by the National Executive Power at different periods (1973, 1983, 1989 y 1991). This legislation also regulates all matters related to the certification and marketing of seeds. On the other hand, they are based on the *Invention Patents and Utility Models Law*, amended in 1996 by bill Nº 24572 that authorizes GMOs to be patented.

In an attempt to adapt to the international regulatory framework for seed protection, in 1994 Argentina signed on to UPOV 78. With this, the producers still hold the right to freely produce their seeds – with the exception of commercial sales – and the authorization to use the harvest production obtained on their farms. In 1996 Resolution 35/96 was passed; through this, the National Seed Institute (INASE) adopted new requisites in relation to the "*farmer's exception*", specifying conditions of the exception, hence restricting the *use* of their own seeds.

In 1999, the Argentina Association for the Protection of New Varieties of Plants (ARPOV) tried to legalize a permanent royalty for the use of seeds by means of a marketing method called *extended royalties*, which claimed that the royalty for licensing the production and marketing of seeds would

also be extended to the successive sowings carried out by each farmer with seeds from his private harvest. However, the proposal was given very little support, and thus was not implemented.
In 2003, Resolution 52/03 was sanctioned. In this resolution, the SAGPyA (Ministry of Agriculture, Livestock, Fisheries and Food) makes it obligatory to report the quantities per variety of seed used in each sowing. That same year, the Ministry presented a proposal to create a global royalty or a Technology Trust Fund Compensation for seed production in order to compensate breeders.

The strongest mobilization began at the end of the 1990s. Several organizations, such as Mocase, approached the subject with a comprehensive vision, associating production with land. With the help of other rural and urban associations, the organization set up workshops in several provinces, leading the Resistance Forum against GMOs (2003). It also protested against the clearing in Santiago del Estero and other provinces. Also, schools were created for seed storage. Other organizations such as Greenpeace pointed out the problems involving human consumption. During the year 2000, Greenpeace denounced multinationals such as Knorr, Pringles and Granja del Sol y Norte for using these organisms without publicly divulging it in the product composition. They also started the "*Transgénicos: exigí saber*" (*GMOs: demand to know*) campaign through training courses, advertisements providing basic information on the subject and demanding a labeling law.

In 2001, several social organizations denounced the presence of illegal corn (NK603) distributed by Monsanto to the Ministry of Agriculture. While the SAGPyA acknowledged this information and committed to recognizing and eliminating these productions, no specific information was published on the fate of this GMO that was released in 2004. Since then, a process was set in motion to reclaim civil society's participation in the release of GMOs. Together with this opposition, during that same year 2001, the lobbying of countless individuals inside Congress slowed down the bill presented by Alberto Briozzo (FREPASO), which eased release requirements.

Currently, the debate on genetically modified organisms refers mainly to:
*Monocultures: from the beginning of the extension of this model, the indigenous and farming communities' request to stop the spread of soy was decisive in the debate over native forests in Argentina. The result of these claims being put forward to the National Congress was the ratification of the Forest Law (N° 26.331) in 2007. However, mechanisms for implementation have not yet been established while clearings and evictions are continuing, in many cases with brutal repressions by police forces. An instance of this was the death of indigenous people in Formosa, November 2010.

*The use of agrochemicals: the extended consequences of Glyphosate use have brought together local social organizations that denounce cases of contamination to humans daily. At the same time, the scientific sector intervened in the matter. In 2008, Dr. Andrés Carrasco published the results of his experiments, corroborating Glyphosate's toxicity level. This brought him critical attacks from most fellow scientists but on the other hand, the support of organizations that had been investigating the problem. As a result, provincial laws regulating the use of Glyphosate began emerging, complaints of contamination began taking effect and the Executive branch began to intervene in the matter, requesting the Ministry of Health to investigate cases such as the one in Ituzaingó, Cordoba.

*Income redistribution: Considering the fact that Argentina produced over 55 million tons of soy on more than 18. 56 million hectares with a yield of 2.95 tons per hectare[47] in the year 2010, the biotechnological model in Argentina is considered to be one of the main currency generators in the country since the 2002 devaluation. This is mainly why the Argentine government tried to establish a tax regime with retentions for farming exports in 2008, causing huge debates over agricultural income distribution. This was known as the "debate for the 125[48]", in which its official spokesmen and the government ignored both problems concerning land *(el mal llamado campo[49])* and related to the production model based on the biotechnological package. Following this process, however,

[47][47] http://www.finanzasblog.com.ar/cosecha-de-soja-argentina-2010/
[48] Refers to the decree number that regulated the retentions
[49] Known as "so called field" because this concept tried to symbolically cover this sector, however, it only represented producers placed in important positions in the commodities agro-export chain, ignoring the rural farming sector, the indigenous people and rural workers.

other neglected sectors and debates regarding the problem acquired visibility. This process brought out into the open the dangers of Glyphosate and initiated a debate on the problems surrounding rural slave work.

* Rural slave work: rural slave work has attracted a great deal of attention in the last few months, following the discovery of rural workers exploited on farm land by the company Nidera. From then on, a large number of farms (belonging to other multinationals such as Status Ager S.A) were closed down and accused of keeping workers under aberrant living conditions (trailers without toilets, electricity or running water, etc.). This has led to a huge social debate concerning illegal rural work (which in Argentina is close to 70%), and the very poor working conditions of these workers. The judiciary has intervened in the matter, defining this "human trafficking"

* The Seed Law: because of insistent pressures from the seed industry, a series of government initiatives have been raised with an aim to amend the seed legislation. This is visible in the attempts to support UPOV 911 for which the Seed Law would have to be modified to be in line with the new international agenda. The various bills drawn out during 2002 and 2003 were never approved. At the end of 2007, it was public knowledge that amendments were underway. The base project that was worked on during that year was developed by the Centre for Intellectual Property at Austral University and coordinated by Miguel Ángel Rapela, who is also the director of the Investigation and Development Department of Relmó, the seed company. Finally, at the end of 2010, the National Seed Committee (Conase), which assembles representatives from the government, businesses from the seed sector and producers, announced that it had finished drawing out a new Seed Law. This was not sent to legislators for discussion as members were unable to agree on a system for royalty payments.
Agricultural workers and indigenous movements, gathered at the Farmer - Indigenous National Committee, and environmental assembly movements such as the Citizens Assembly Union (UAC) have worked on the problems surrounding the agrarian biotechnological model (representing mainly soy, among others) comprehensively.

Brazil
GMOs entered Brazil illegally through the state of Rio Grande do Sul in the mid 1990s. The existence of a law on biodiversity at the time (law 8.974, January 5, 1995) was the initial outline for the regulation of production and research of genetically modified organisms. The Biotechnological National Committee (CTNBio) created by this law was intended to make decisions regarding the release of GMOs. Thus the CTNBio was satisfied with the presence of several state commissions and members of the scientific and industrial communities as well as representatives from the Consumer Protection Act. This law, which tried to regulate biotechnological research, did not, however, permit the legal use of genetically modified organisms for production and marketing.

In September 1998 by means of an administrative measure, the CTNBio authorized the farming and marketing of genetically modified soy and recognized Monsanto's ownership of this product. Immediately after this decision was adopted by the federal organization, Greenpeace and Idec submitted a cautionary measure to the Brasilia Supreme Court, which was ratified in June 2000. Protected/backed by the National Constitution, the ruling demanded an Environmental Impact Study (EIA/RIMA) and labeling regulations before the release of RR soy. In an unprecedented court ruling, the same court confronted law 8.974, issuing a second cautionary measure that forbade the CTNBio to be conclusive in their judgment on requests for the commercial release of genetically modified organisms.

While Cardoso's government was in favor of genetically modified organisms, as evident from several official documents signed by the President and his cabinet, the resistance of several social movements slowed down the process preventing Cardoso's government from being the main driving force in the consolidation of this model.

In the year 2000, a shipment of genetically modified corn reached Brazil from Argentina. The federal justice voided the authorization, requiring the government to carry out an investigation on

environmental impact. It also declared unconstitutional a decree announced by Cardoso[50]. Four days later, however, the CTNB challenged this judicial ruling (with the backing of the Ministry of Science and Technology), allowing the entrance of thirteen varieties of genetically modified corn for animal fodder. As a result of this judicial conflict, president Cardoso ruled provisional measure N° 2137, which included the Ministries of Environment and Agriculture as competent organizations to release GMOs.

In 2003, Lula ruled provisional measure Nº 113 (subsequent to law 10.688) that authorized the marketing and consumption of genetically modified soy until January 31, 2004. Subsequently, provisional measure N° 131 (which then became law 10.814) extended the period until 2005 while authorizing harvesting for that same year. With both provisional measures (all ratified by the legislature) the production companies and the producers using this technology were exempt from accusations of contamination, and were authorized to collect intellectual property royalties.

In 2004, the pressure from social movements made it compulsory to label products with over 1% of genetically modified organisms. In 2005, provisional measure Nº 223 (law 11.092 from 2005) authorized the marketing of RR soy. This law also established royalty fees. During the same period, genetically modified cotton was also being planted, along with corn and soy, all of which was illegal. Finally, on March 24, 2005 the new Biosafety Law (Nº 11.105) was approved. The new law established control over the opinions published by the CTNBio through a new advisory board named National Board of Biosafety (CNBS)[51].
By 2006, soy accounted for 90% of oleaginous grains and 90% of vegetable oils, increasing production 120% within the last 10 years.
Brazil currently has 28 released GM plant, 12 GM bacteria and one GM yeast.

Crop	Event	Characteristic	Year
Soy	GTS 40-3-2	Tolerant to glyphosate	1998
Soy	Cultivance	Tolerant to imidazolinone herbicides	2009
Soy	Libertylink	Tolerant to Ammonium glyphosate	2010
Soy	A 5547-127	Tolerant to Ammonium glyphosate	2010
Soy	BtRR2Y	Resistant to insects and tolerant to glyphosate	2010
Corn	T25	Tolerant to Ammonium glyphosate	2007
Corn	MON 810 YieldGuard	Resistant to Lepidoptera	2007
Corn	BT11	Resistant to Lepidoptera and tolerant to Glufosinate ammonium	2007
Corn	NK 603	RR- Tolerant to glyphosate	2008
Corn	GA21	Tolerant to glyphosate	2008
Corn	TC1507 Herculex	Resistant to Lepidoptera and tolerant to glyphosate	2008
Corn	MIR162	Resistant to Lepidoptera	2009
Corn	MON 810x NK603	Resistant to Lepidoptera and tolerant to glyphosate	2009
Corn	Bt11x GA21	Resistant to Lepidoptera and tolerant to glyphosate and glufosinate ammonium	2009
Corn	MON89034	Resistant to Lepidoptera	2009
Corn	TC15074x NK603	Resistant to Lepidoptera and tolerant to glyphosate and glufosinate ammonium	2009
Corn	MON89034xNK603	Resistant to insects and tolerant to glyphosate	2010
Corn	Bt11xMIR162xGA21	Resistant to insects and tolerant to glyphosate and glufosinate ammonium	2010
Corn	MON 8817	Resistant to insects and tolerant to glyphosate	2010
Corn	MON 89034x TC1507x NK603	Resistant to insects and tolerant to glyphosate and glufosinate ammonium	2010
Cotton	MON 531- BOLLGARD 1	Resistant to Lepidoptera	2005
Cotton	LLCOTTON25	LL (LibertyLink) Tolerant to glufosinate ammonium	2008

[50] This decree gives the CTNBio the power to waive environmental impact studies
[51] This body was created independently to monitor CTNBio in its questionable activities. See http://www.idec.org.br/emacao.asp?id=656

Cotton	MON 1445	RR Tolerant to glyphosate	2008
Cotton	281- 24- 236/ 3006- 210- 23 (Widestrike)	Resistant to Lepidoptera and tolerant to glufosinate ammonium	2009
Cotton	MON 15985- BOLLGARD II	Resistant to Lepidoptera	2009
Cotton	MON 531- MON 1445	Resistant to Lepidoptera and tolerance to glyphosate	2009
Cotton	GHB614	Tolerant to glyphosate	2010
Cotton	GHB119 x T304-40	TwinLink- Resistant to insects and tolerant to glufosinate ammonium	2010

Also, Embrapa reached a record level of agreements with leading multinationals dealing in genetically modified organisms (Rudiño, 2006). Meanwhile, Anvisa (the National Agency for Health Security) called for a referendum during the months of July and August 2007, in order to lay down the rules for the commercial release of food containing GMOs. This state body had the support of organizations such as Idec and Greenpeace, who are against the CTNBio, and considers that releases should comply with the measures established by the 2005 Biosafety Law.

In the 2009/ 2010 23.5 million hectares of soy were planted, 70% (16.5 million) of which is estimated to have been genetically modified. Of the 13 million hectares of farmed corn, 4 million were genetically modified. Finally, 134 million out of 835 million hectares of cotton was genetically modified.

While Brazil did ratify the Cartagena Protocol, it continuously defended the position of those States that ensured that their GMO shipments could be marketed worldwide with vague and imprecise information (UNEP- GEF, 2004).

In the course of this last year, the federal justice of Paraná (one of the states that has been most strongly opposed to GMOs) accepted the request by several social movements to put a stop to the market release of Bayer's LibertyLink corn due to the lack of controls on its impact on health and the environment. From then on, the CTNBio was forced to guarantee the participation of civil society in the process of GMO releases. It also must establish rules to limit confidentiality clauses and eventually authorize public access to the information.

Uruguay

The first GMO approved for release in Uruguay was soy carrying the GTS 40-3-2 transgenic event, known commercially as RR (Roundup Ready) Soy owned by Monsanto. It was approved in the year **1996** by the MGPAs Administration for Agricultural Protection without any risk assessment and with no biosafety measures. At the time, the country had no regulations for the introduction of genetically modified plants. Starting from the authorization, the farmed area has been constantly increasing, from 10.000 hectares for the 2000/01 harvest to 580.000 hectares for the 2008/09 harvest, representing 75% of the area sown with summer crops.

In August **2000**, by means of a Presidential Decree a Commission on Risk Assessment of Genetically Modified Plants (CERV) was created, with representatives from the Ministries of Livestock, Agriculture and Fisheries; Housing, Spatial Planning and Environment; Public Health; the INIA (National Institute of Agricultural Investigation and the INASE (National Seed Institute). Their tasks were to analyze every request for the release of new genetically modified organisms and to advise the relevant authorities on risk assessment, management and communication.
The CERV recommended authorizing the release of two new genetically modified events, both corn. In **2003** the release of **Mon810** (Monsanto) corn was approved and in **2004 Bt11 corn** (Syngenta) was approved.

(a)Table 1. Approved GM events.

SPECIES	EVENT	MULTINATIONAL	CHARACTERISTICS	GMO	ORIGIN	APPROVAL
Soy	GTS 40-3-2 (RR)	Monsanto	Tolerant to glyphosate	CP4 EPSPS	*Agrobacterium tumefaciens*	CROP 1996
Corn	Mon810	Monsanto	Resistant to lepidoptera	Cry1Ab	*Bacillus thuringiensis*	CROP 2003
Corn	Bt 11	Syngenta	Resistant to lepidoptera/ Tolerant to glyphosate	Cry1Ab/PAT	*B. thuringiensis / S. viridochromogenes*	CROP 2004
Corn	GA21 (RR)	Syngenta	Tolerant to glyphosate	mEPSPS	*Corn (genetically mutated)*	TRIAL 2009
Corn	GA21 x Bt11	Syngenta	Tolerant to glyphosate/ Resistant to lepidoptera s/ Tolerant to glufosinate	Cry1Ab/ mEPSP		TRIAL 2009
Corn	TC 1507 (Hercule x)	Pioneer/ Dow	Resistant to lepidoptera/ Tolerant to glufosinate	Cry1F/PAT	*B. thuringiensis / S. viridochromogenes*	TRIAL 2009
Corn	NK603 (RR)	Monsanto	Tolerant to glyphosate	CP4 EPSPS	*A. tumefaciens*	TRIAL 2009
Corn	TC 1507 x NK603	Pioneer/ Dow	Tolerant to glyphosate/ resistant to lepidoptera s/ Tolerant to glufosinate	Cry1F/PAT/CP4 EPSP		TRIAL 2009
Soy	A 2704-12	Bayer	Tolerant to glufosinate	PAT	*S. viridochromogenes*	SEED 2009
Soy	Mon89 78 8 (RR2Y)	Monsanto	Tolerant to glyphosate	CP4 EPSPS	*A. tumefaciens*	SEED 2009

In green: events commercially produced; in yellow: events included in the national crop assessment: in orange events authorized for seed production.
*Origin of the GM species. Species of origin of the GM

Currently, the debate on genetically modified organisms mainly refers to:
*****Biosafety
2005: The National Administration for the Environment (DINAMA), with funding from the PNUMA-GEF, developed a project for a 'National Biosafety Framework'. The purpose of this project was to draw out a proposal for a National Biosafety Framework in accordance with the commitments taken on with the Cartagena Protocol. A National Coordination Committee (CNC) was created to coordinate between different state bodies, research institutes and organizations created by civil society. The CNC began to operate in August 2005.

2006: In the month of March, several social organizations (APODU, RAPAL, the Environmental NGO Network and REDES-AT) submitted a series of recommendations to the CNC. Among these was the proposal to establish a moratorium on the release of new GM events with the understanding that one couldn't start a debate for the creation of the National Biosafety Framework while simultaneously approving new GMOs.
In August, these organizations stopped participating with the CNC due to the lack of response to the complaint concerning the marketing of genetically modified sweet corn, filed ten months before, and the lack of attention paid to the recommendations presented along with disagreements with the Project Coordinator. That same month the Ministry of Housing, Spatial Planning and Environment announced a decision to ban the use, production and marketing of genetically modified sweet corn.
2007: On 29 January an 18 month moratorium was imposed for the treatment of requests for the authorization to introduce new genetically modified plant (Presidential Decree 37/007).
2008: The **Presidential Decree 353/008** put a stop to the moratorium on the treatment of requests for the authorization to introduce new genetically modified plant events. The ruling established a policy of '**regulated coexistence**' between GM and non-GM plants, generating a new Institutional Structure regarding Biosafety in which decision-making is in the hands of the National Biosafety Cabinet (GNBio).

- It defines voluntary labeling "GM" or "non GM" to inform consumers.
- It creates a non-binding Biosafety Advisory Committee (CCB), with the participation of several social institutions with regards to biosafety policies.
- Regarding the participation in the process of authorization of new GMOs, it establishes that there will be information available to the public and an advisory instance (non-binding).

***GMO contamination in corn crops**
The Ministry of Housing, Spatial Planning and Environment (MVTOTMA) resolutions 276/2003 and 292/2004 established as requirement for GM cultivation that 10% of the cultivated area should be carried out with non GMOs in order to protect biodiversity, and that there should be an isolation distance of at least 250 meters from non GM crops in order to avoid contamination. These measures, however, did not do enough to stop contamination in non-GM corn. Furthermore, there is scientific research that proves the persistence of Bt toxins produced by these corns, both in the soil and in the water streams that can affect the ecosystems' biodiversity. One of the important consequences of GM contamination is that it violates the principles of coexistence, implying that producers who chose to produce non-GM corns are not protected.

Paraguay
Soy entered into Paraguay illegally from Argentina (and on a smaller scale from Brazil) at the beginning of the 1999- 2000 season. Since its introduction, production growth has been approximately 10% per year. This means that of 9 million hectares of the crop planted for that season, it rose from 1.5 million during the 2004-2005 season to 2.5 million hectares during that of 2009-2010.
In Paraguay agriculture makes up for 17% of the country's GDP. Soy represents between 8 and 10% of that percentage, 80% of which is genetically modified.
This crop represents 33% of exports (entirely grain), mainly to the European Union, Argentina, Brazil, Middle East and Canada. Since 1993, GM corn farming has been banned by the Environmental Impact Assessment law (Nº 294/93). However, in January of that same year the Paraguayan Institute for Agrarian Technology (IPTA) - recently created by President Fernando Lugo - gave the multinational Monsanto the authorization for GM corn field trials, allowing for experimentation of the varieties MON810 TC 1507, BT 11, VT3Pro.

This strengthened the complaints filed by the Paraguayan National Campaign for non GM Corn in which environmental and human rights organizations participate. Meanwhile, Bt cotton is authorized for field trials since the 2007- 2008 season, and currently 8000 hectares are being farmed. In 1997, debates concerning biosafety regulations began taking place in the country. That same year, the Ministry of Agriculture and Livestock (MAG) was held responsible for controlling the use of GMOs and for the authorization of field trials and commercial releases (decree Nº

18.481). This led to the creation of the Committee for Agricultural and Forest Biosafety (COMBIO), in charge of advising on the subject. In 2008, the composition of this committee was modified. Currently, there are 13 participating members from the public sector, with a strong multidisciplinary nature.

Following the ratification of the Cartagena Protocol on Biodiversity in 2003, this legal framework was revised. The bill on Biosafety, however, was never approved. The executive order was widened (decree Nº 12.306), establishing that the approval for experimentation on plants would be carried out by the SENAVE (taking into account Seed Law 385/94), while the approval for livestock releases would be in the hands of the SENACSA (Law 2426/04). GMO release for experimentation is carried out in accordance with law 294/93 which establishes the mechanisms for the Environmental Impact Assessment.

On a legislative level, the approval process following the trial requests are currently under serious debate and in permanent review. The MAG has set up an advisory system with national workshops specifically for this purpose. In respect to the analysis of simple or stacked transgenics, the institutions in charge of establishing regulations have not considered the need to set up different evaluation mechanisms due to the fact that the studies are carried out on a case-by-case basis. In general terms it can establish that the regulations merely respond to the administrative system set up by the Executive.

Considering that Paraguay has a large population of farmers, the main problems human rights organizations have faced in the last few years are migration and the impoverishment of the living conditions of farmers in rural areas. Meanwhile, rural organizations opposed to the advances of the model are constantly suffering abuse of power from official authorities and paramilitary groups.

The consequences of the Model

The changes generated by the implementation of GMOs caused a series of extremely negative and worrisome consequences for agricultural producers and rural farmers in the four analyzed countries.

1. ***The expansion of soy cultivation requires the constant occupation of new soil, the substitution of other crops and/or the forced displacement of livestock to other areas.***

In the pampas region of Argentina, the progression of this type of crops occurred in areas where the activities previously carried out focused mainly on export markets (agriculture, livestock and dairy). Outside the pampas area, single-crop farming for export transformed GM soy into the main commodity, violating regional economies and leaving other important productions such as rice, cotton, grass, citrus and sugar behind. The 1994 Agricultural National Survey (ENA) counted 53.156.954 head of cattle, while the 2000 ENA registered 48.674.400, meaning there was a negative variation of 4.482.554 head of cattle.

Regarding productions displaced by soy, rice is the most affected, with a 41% decrease, followed by sunflower, with a 34% decrease, and corn, that lost 26.2% of cultivated surface. In Uruguay, soy grew to 291.000 hectares between the 2002/03 and 2006/07 harvests, mainly in the west coast, a typically agricultural area. Therefore it would be reasonable to assume that soy will displace other summer crops, mainly sunflower. It also takes over land for agriculture, cattle and dairy.

2. ***The growth of the soy industry has impacted the land and production in such a way that it is now in fewer, and foreign, hands.***

The introduction of genetically modified crops has led to sheer consolidation of land resources in all countries – encouraging mass exploitation and giving way to larger scale production methods: contracting[52] and investment funds, and seed growing pools[53]. In both these areas, we see a

[52] **Contracting** refers to the activity of corporations that as a legal entity manage sub contractors and offer an exchange of services.

[53] **Seed pools** refer to corporately driven efforts which allow for expanded development and management of large volume production and which are comprised by groups of investors, run by agricultural experts, and managed by private consultants who take over third party land for large scale production. They normally do not offer workers any stability,

consolidation of new non-agrarian players and an increase in investment in the agricultural industry. These factors have helped the surge of mega-producers such as Soros, Benetton and Grobocopatel. This fact, combined with a drive towards short term high yield means production is now in fewer hands, to the detriment of manual production and of family and small-scale farming.

10% of **Argentina's** largest farms account for 78% of the registered land. Meanwhile 60% of small-scale production accounts for less than 5% of the country's agriculture. The 2002 census revealed that 174.8 million hectares of land was designated for agricultural development (referred to as *Explotaciones Agropecuarias* (or EAP lots), with a loss of 2.6 million hectares in that census count. Conversely, there was an 8.7% increase in newly sowed land that in itself increased the total agricultural land use. The number of EAP lots decreased by 20.8 %; in other words, there are 87,668 fewer EAP lots than there were in 1988, while the median land surface of an EAP has increased by 20.4 %, going from 469 hectares in 1988 to 588 in 2002.

In **Brazil**, the recently published results of the 2006 census show that the number of properties smaller than 10 hectares that are associated with 2.5 million families decreased from 9.9 million hectares to 7.7 million hectares. Meanwhile a total of 31,899 landholders manage 48 million hectares of lots which are larger than 1000 hectares each. Likewise, another 15,012 landholders with lots that are larger than 2500 hectares account for 98 million hectares of the land. Production itself has also been consolidated and has changed. On one hand, agricultural exploitation has focused on export products such as soy, corn, sugar cane, and livestock, which account for most of the land. The three crops mentioned above account for 32 million hectares, while the basic foods pertaining to a Brazilian diet barely account for only 7 million hectares on which rice, beans, *mandioca* and wheat are grown. Home-based agriculture produces food for the internal market. *Agribusiness* produces commodities (dollars), for external markets. This is why it is so influenced by large multinational corporations, which control the market and pricing. The 20 largest agricultural corporations accounted for BRL$ 112 billion of the GNP in 2007. In other words, nearly all *agribusiness' production* is controlled by only 20 large companies.

In **Uruguay**, the development of soy products has also resulted in the consolidation of production. In Uruguay's case over 60% is managed by seed pools mostly funded with Argentinean capital; this has deepened a structural tendency in the Uruguayan countryside: the disappearance of small-scale units and the advance of larger ones. Between the years 1960 and 2000, 30,000 producers with lots 100 *hectares* or less disappeared while the number of producers with lots larger than 100 *hectares* has remained steady and even increased.

In **Paraguay**, the soy industry has displaced over 12% of lots 20 *hectares* or smaller. In contrast, lots larger than 1000 hectares jumped from accounting for 16 to 21% of farmed land within the last ten years. This country is also living through a phenomenon
labeled *Brazilianization* which means that 81% of soy production is on land which borders Brazil, where capital investments from the country are linked with Paraguayan politics which result in stronger measures being taken, such as expulsion against any farmer that resists.

3. *The expansion of agricultural borders comes hand in hand with deforestation, six times higher than the world's average, and which is among soy crop monoculture's greatest environmental consequences.*

In Argentina, deforestation increased by almost 42% in four years. This logging operation cleared more than 1 million *hectares* mostly for soy planting. Soy monocultures spread to native hillsides, such as the *Chaqueño* forest (*Bosque Chaqueño*) located in the provinces of *Chaco*, *Formosa*, *Santiago del Estero*, and the northeast sections of *Santa Fe* and of *Salta*. Complete habitats have been lost at a rate of up to 30 thousand *hectares* of woodland per year. This means that in the past 30 years, Argentina has lost 70% of its native forests.
In Brazil, though the rate of deforestation of the Amazon has decreased in the past year (only 7008 square kilometers of jungle were destroyed), its jungle and forest land have been disappearing

but instead employ them for short periods, and are focused on immediate benefits/gratification, rather than long term investment.

gradually over the past 20 years, decreasing by 20%. At its worst point, in 2003-2004, the growth of the soy industry was responsible for the destruction of 27,329 square kilometers of the biome.

4. ***Another environmental factor related to genetically modified crops is the use of chemicals to them associated.***

Between 1996 and 2007, the use of agrochemicals in Argentina increased from 30 to 270 million liters. Herbicide imports increased 330% with the introduction of genetically modified soy. As compared to traditional fields, the use of herbicide for genetically soy plantations was 9.1 million kilograms higher in 2001 alone. Glyphosate became the most widely used plant health product, with sales increasing from over 1,3 million liters in 1991, to 8.2 million in 1995, to over 30 million in 1997. In 2008 between 160 and 180 million liters of Glyphosate were used. This resulted in a turnover of USD 263 million in 2000, accounting for 42% of the agrochemical market. In 2003, Glyphosate's market share was around USD 350 million, a figure that would increase along with the push for RR corn crop production (a variety approved in 1996) in lieu of more conventional varieties. Towards 2008, the turnover was over USD 600 million.

In Paraguay, the use of agrochemicals served as a focus for and gave impetus to a number of farmer groups and human rights organizations in the country. The poisoning and death of Silvino Talavera, and the resulting judgment that charged the offenders set a precedent that empowered the fight. This fact notwithstanding, by 2010 the use of agrochemicals has increased to 71.4 million liters. It also remains a fact that schooling in rural areas must be suspended during spraying periods for mosquito control and crop dusting given that these areas are literally fumigated.

5. ***The growth of soy as an industry has driven out small producers en masse, and led to a model of agriculture without farmers.***

This is the greatest impact direct seeding has had on farming. The reduction of labor needs in the seeding process has lowered the demand for human labor, thus dropping employment per hectare while increasing productivity.

Argentina has reduced its labor costs by 35% (35% in tractors and 25% in other farm machinery). This reduces the former standard of labor required (3 man hours per hectare) to 40 minutes per man per hectare in direct seeding operations, resulting in less seasonal employment and fewer permanent jobs.

In Uruguay, farm labor productivity in 2001/02 was estimated at 285 hectares per worker (3.5 workers per 1000 *hectares*) whereas during the 2006/07 soy boom, it had increased to 310 *hectares* (3 workers per 1000 *hectares*). In more technically oriented farming operations, worker productivity was even greater, at 356 *hectares*, with an overall labor reduction (2.8 workers per 1000 *hectares*).

6. The soy phenomenon is a primary cause of the exclusion, uprooting and impoverishment of indigenous and farming communities at large.

In its clash with traditional production methods and ways of life the soy industry has *displaced* indigenous and peasant communities often through brutal, violent evictions leading to their isolation and also to the contamination of rivers, multiple plants, animals and humans with toxic agricultural substances. In the process, land that had been traditionally used as seasonal pasture was privatized and aggressively transformed through excavation and leveling. In Paraguay, these events have resulted in one of the most appalling examples of forced migration, with the displacement of large numbers of farming families and the development of large rings of urban ghettos. The expulsion of farmers, which employs brutal methods, is a driving force of human rights activity in the country.

Biofuels

Any discussion on agricultural biotechnology must include a mention of biofuel production. The development of biofuels as a renewable energy is yet another way in which the model we have discussed has found ways to grow, most notably in countries such as Argentina and Brazil where this model is well established and where the movement in the southern cone has spearheaded.

While today the production of biofuels in Argentina remains under-developed (mostly centered around Repsol's group of companies - YPF, Esso, Shell, and EG3) it was encouraged by a law regarding biofuels (also known as Law 26.093) that, together with a 2001 decree known as decree

number 1396/01, established financial incentives to fuel producers which obligated them to replace, by 2010, 5% of fossil fuel, with bio-ethanol or biodiesel54. The largest producers of genetically modified crops responded to this with huge investments in the sector, leading to a significant development of industrial plants and the development of state projects[55]. Currently, private investment amount to USD 700 million. New investors principally include Bunge, Cargill, Dreyfuss and Repsol.[56] Today, the majority of capital investment is concentrated in the port of Rosario area.

In the first quarter this year, 176 tons of biofuels had been already exported for a value of USD 191 million, a 7.7% increase over last year.[57] The production of these biofuels currently requires imports of some 3 to 5 million tons of soy from Paraguay and Brazil. Finally, the government invests public funds towards research and infrastructure (hydro-ways and roads for transport) that support the production and sale of grains and soy derivatives for export. While the production of ethanol from sugar cane has yet to be developed, there have been recent investments in Salta and Tucumán.[58] The Ministry of Agriculture continually seeks to promote projects for the production of biogas and biodiesel. The 5% cuts mandated by the biofuel law[59] which became effective last year will require 886,152,700 liters of biodiesel and over 330 million liters of bioethanol to meet Law 26.093 goals. Argentina's National Institute of Agricultural Technology (*INTA*) calculated that in 2010 close to 52,000 hectares of sugar cane would be needed for bioethanol.[60]

Brazil, the other main player in its production, is the main exporter of ethanol in the world with 16 billion liters annually, mostly produced from sugar cane (Sagpya - IICA, 2005). Over the past years, the Brazilian government has promoted investments in ethanol research and production, which has generated a cash flow of close to USD 2 Billion.[61] The agreements made with the US in March 2007 as well as government projects to triple ethanol production by 2020 illustrate the government's priority in actively promoting the ethanol market, as much for export as for internal consumption (Green, 2007). Furthermore, the State is to invest over BRL 355 million (between Petrobrás and Embrapa) towards biofuel research, which is an important indicator of the role these players will have in the future development of this sector.

Meanwhile, the government of Brazil is supporting biodiesel efforts through the production of oils from castor beans, palms, sunflowers and most importantly, soy. In order to meet the national demand for B2s,[62] the farmland needed to grow the seed will be expanded by 6%. Meanwhile, B5, the other derivative used in the production of diesel, will require roughly a 16% increase of soy farmland (Sagpya- IICA, 2005).

From 2005 onwards, the Brazilian government has instituted a number of laws that encourage biodiesel production. Among these, Law 11.097 established the presence of biodiesels in the energy matrix by instituting a requirement to add 5% bio products in the production of diesels. Furthermore, it made B2 compulsory by 2008 and B5 by 2013. The role of the *ANP* (National Petroleum Agency) in regulating these matters, the creation of financial incentives supporting research and production, and the implementation of a stamp of social responsibility known as the "social fuel" stamp – which was granted to biodiesel producers for including family farmers in the

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[54] Farmer's Supplement *Clarín Rural*, Special Edition "Biofuels: Energy from the Farm," May 5 and June 2 2007.

[55] These projects include Grutasol in Pilar and Biocom- Tres Arroyos, Province of Buenos Aires, Oil Fox, Horreos, Repsol YPF, Aceitera General, Deheza Dreyfus, in Santa Fé, Codesu in Neuquén, Monte Buey in Córdoba, the government of the Province of Chaco, Eurnekian in Santiago del Estero, Vicentín in Rosario. For more information go to www.sagpya.mecon.gov.ar .

[56] It is calculated that investment in biodiesel plants will reach USD 1.8 billion by 2015, from Sagpya- IICA (2005); *A Perspective on Biofuels in Argentina and Brazil, Buenos Aires*.

[57] It is relevant to observe that one of the motivators behind this growth, due to existing legislation, is the fact that biofuels are exempt from export duties. This means that, with increases in agricultural taxing, it was more profitable to export biofuel derivatives.

[58] November 2006 Reuters Press Release.

[59] It is estimated that diesel and naphtha consumption will reach 17,723,000 liters and 6,616,000 liters respectively.

[60] Premici, Sebastián and Lukin, Tomás (2009), "From Sugar Cane to Bioethanol", in *Clarín Económico*, May 6 2009.

[61] The Interamerican Development Bank (IDB) invested in Latin American biofuels. USD 570 of the USD billion investments was earmarked for Brazil. IDB Press Release of April 2, 2007.

[62] B2 Biodiesel is a mix of 2% biodiesel with 98% of regular diesel, whereas B5 is a 5% mix of biodiesel and 95% regular diesel.

raw materials production chain - (2004), and the development of the National Program for the Production and Use of Biodiesel (PNPB)[63] in 2003, illustrate just how active the government has been in encouraging the development of biodiesel. There are 9 biodiesel producers in Uruguay today. One of these was developed by the city of Paysandú that bases its production on sunflower oils. The other, located in Montevideo, develops biodiesel from frying oil. The largest plant in the country currently produces 3 million liters monthly using beef tallow, obtained from slaughterhouses. It is also a member of ANCAP, a national company that holds the major investments in its production, and which aspires to replace 1% of the country's diesel consumption.

While Uruguay is considered one of the most attractive countries for biodiesel production, alongside Malaysia, Thailand, and Colombia, its production capacity is clearly restricted given the limited land resources (essential for the generation of crops for oil extraction) the great majority of which is already exploited in the production chain.

The legal and regulatory framework for biofuels has been very recently adopted in this country. In 2002, the Law for Production of Alternative, Renewable Combustibles and Replacement of Fuel Derivatives (*Ley de Producción de Combustibles Alternativos, Renovables y Sustitutivos de los Derivados del Petróleo,* also known as Law 17.567) was instituted, proclaiming the production of renewable fuels and substitutes for fuel derivatives produced with local raw materials, from either plant or animal products to be in the national interest. Five years later, by the end of 2007, a Law on biofuels and agricultural fuels (also known as Law 18.195) was passed though related regulations have yet to be developed. In general terms, the law wants to encourage and regulate production, business development and the use of biofuels. Towards this end, it has created an institutional framework for the market, established incorporation goals and developed quality standards and financial incentives to encourage the use of national raw materials in the process.

As for Paraguay, the greater percentage of genetically modified soy is produced for export to countries such as Argentina and Brazil to support the production of these biofuels. The country is also strongly developing the *jatropha* plant (some 200 thousand hectares) in order to produce biodiesel locally. Corn, Soy, Canola and other crops are also being targeted for this same purpose. Currently, there are 4 production plants dedicated to producing this fuel, with 30 million liters being produced annually from animal fat. As a result, the main investors in the country are cold storage businesses. Also, Paraguay has instituted a biofuel law requiring decreases of B3% in 2008 and B5% in 2009. Considering that the country's oil industry has a capacity of 2 million tons per year, all of which is exported, the oil crop producers see the production of biofuels as a passport to the global commodities market.

*** *Carla Poth,*** *Red pro una América Latina Libre de Transgénicos (RALLT) - GE Free Latin America Network was born inspired by the need for communities to develop comprehensive strategies to deal with the introduction of GMOs and prevent new introductions in the region by supporting national processes within the region, under the principle of food sovereignty.* ***www.rallt.org.***

[63] It includes research, production, and distribution recommendations for biodiesel and its raw materials.

A. The Americas

SOUTHERN CONE OF SOUTH AMERICA
Genetically modified organisms - the related policies and debate in the Southern Cone region of South America

*Pablo Galeano, REDES-FOE, Red de Ecología Social –Network of Social Ecology.FOE**

The Southern Cone of South America, composed of Argentina, Chile, Paraguay, Uruguay, and parts of Southern Brazil, is one of the world's largest agricultural reservoirs, thus it is a major target area for transnational biotechnology corporations to promote genetic modification (GM) technology. Genetically modified organisms (GMOs) have become a key element in the Southern Cone's agribusiness sector. Agribusiness has developed technology packages to ensure a rapid return and profits on the invested capital. These technology packages are based on the use of heavy agricultural machinery, herbicides, GM seeds, and biocides; on reduced use of manpower and the externalization of the environmental and social costs that the use of this technology generates.

Peasant and civil society organizations from the region have been mobilizing against the advance of this agribusiness model that displaces peasant and indigenous communities; causes deforestation with the expansion of agriculture; increases pollution and health problems due to the increased use of agrochemicals; accelerates the erosion of natural resources, and appropriates the knowledge and sovereignty of the people.

Generally, the governments of the region, especially in Brazil, Argentina, and Uruguay, have facilitated the introduction of GM crops by adapting their regulatory frameworks and basing their risks assessments on the information provided by the multinational corporations that own the GM seeds. This has been met with strong criticism and actions from the organized civil society,..

The GM crops that have been introduced and cultivated in the Southern Cone.

Currently in the Southern Cone there are three GM crops: soy, maize (corn), and cotton. GM crops are grown on approximately 46 million hectares in the Southern Cone region (Argentina, Brazil, Uruguay, Paraguay and Bolivia), which represents a third of the total area planted with GM crops in the world (Table 1).

The main crop is soybeans, which comprises more than 45 million hectares (three times the total area of Uruguay), of which 38 million hectares are glyphosate-tolerant GM soy. In the 2009/2010 planting season, 23.5 million hectares of soy were planted in Brazil,[64] of which 70 percent (16.5 million hectares) were planted with GM soy.[65] In Argentina, 18.3 million hectares of soy were planted, almost all of which were genetically modified.[66] In Uruguay, soybean crops covered 860 thousand hectares (over 85 percent of the area planted with summer crops), and almost all of it was genetically modified.[67] In Bolivia, 631,500 hectares of soy were planted according to ANAPO (the

[64] CONAB data available at: http://www.conab.gov.br/OlalaCMS/uploads/arquivos/10_12_09_16_39_39_boletim_portugues_-dez_de_2010..pdf

[65] Article published in Gazeta do Povo, available at: http://www.gazetadopovo.com.br/blog/expedicaosafra/

[66] Information from the Agricultural Information Integrated System available at: http://www.siia.gov.ar/index.php/series-por-tema/agricultura

[67] Agricultural Poll –Winter of 2010. Agricultural Statistics Department, Ministry of Livestock, Agriculture and Fisheries. Uruguay, available at: http://www.mgap.gub.uy/portal/hgxpp001.aspx?7,5,27,O,S,0,MNU;E;27;6;MNU;,

National Association of Oilseed Producers).[68] According to this association, 80 percent of the soy planted was genetically modified. In Paraguay, 2,650,000 hectares of soy were planted (60 percent of the agricultural land in the country), of which 2.2 million hectares were planted with GM soy.[69,70] The "technological innovation" associated with the cultivation of GM soy has promoted once more the development of monoculture plantations and agricultural intensification in the region. This represents a serious setback in terms of sustainable management of agricultural systems.

In Brazil's 2009/2010 planting season, out of 13 million hectares of maize planted, 4 million were planted with GM maize, according to the Conselho de Informações sobre Biotecnologia/Council for Biotechnology Information (CIB) of Brazil.[71] In Argentina, 3.7 million hectares of maize were planted, of which 2.7 million were planted with GM maize,[72] according to ArgenBio, a group dedicated to disseminating information on biotechnology. In Uruguay, 90 thousand hectares of maize were planted during that period, and it is estimated that 80 percent (approximately 70 thousand hectares) were planted with GM maize seeds.[73] Meanwhile, in terms of the cotton crops in that same planting season, in Brazil 134 thousand hectares of GM cotton were planted out of a total of 835 thousand hectares,[74] while in Argentina, 456 thousand hectares were planted with GM cotton, out of a total of 90 thousand hectares.[75]

Table 1. Area planted with GM crops, in thousandsof hectares (planting season 2009/2010).

Country	Soy	Maize	Cotton	Total
Argentina	18,200	2,700	456	**20,945**
Brazil	16.500	4	.134	**20.634**
Paraguay	2.200	----	---	**2.200**
Uruguay	860	.070	----	**930.000**
Bolivia	505	----	----	**505**

To gather data for this table, several sources were consulted due to the lack of official figures in each country. Sources: Argentina: MAGyP Argentina, ArgenBio; Brazil: CONAB, CIB; Paraguay: MAG; Uruguay: MGAP; Bolivia: ANAPO.

[68] http://www.anapobolivia.org/documento/doc_2011.02.09_221234.pdf

[69] http://www.mag.gov.py/dgp/DIAGNOSTICO%20DE%20RUBROS%20AGRICOLAS%201991%202008.pdf

[70] http://www.mag.gov.py/index.php?pag=not_ver.php&idx=134310

[71] Information available at: http://www.cib.org.br/estatisticas.php

[72] Information available at:
http://www.argenbio.org/adc/uploads/imagenes_doc/planta_stransgenicas/TablaArgentinaOGM.ppt

[73] Agricultural Poll –Winter of 2010. Agricultural Statistics Department, Ministry of Livestock, Agriculture and Fisheries. Uruguay, available at: http://www.mgap.gub.uy/portal/hgxpp001.aspx?7,5,27,O,S,0,MNU;E;27;6;MNU;,

[74] Information available at: http://www.cib.org.br/estatisticas.php

[75] Information available at:
http://www.argenbio.org/adc/uploads/imagenes_doc/planta_stransgenicas/TablaArgentinaOGM.ppt

Argentina is the country with the largest area of GM crops, with more than 21 million hectares, followed by Brazil with approximately 20.5 million hectares (Table 1). These two countries are, after the U.S., the main producers of GM crops at the global level.

Table 2. Authorized GMOs for cultivation. Year of commercial release, by country.

Species	Event	Applicant	Trait*	Argentina	Brazil	Uruguay	Paraguay	Bolivia
Soy	GTS 40-3-2	Monsanto	TH(G)	1996	(1998) 2005	1996	2004	2005
Soy	BPS-CV127-9	BASF-Embrapa	TH(I)		2009			
Soy	MON87701xMON89788	Monsanto	RL x TH(G)		2010			
Soy	A2704-12	Bayer	TH(GA)		2010			
Soy	A5547-127	Bayer	TH(GA)		2010			
Maize	176	Ciba-Geigy (Syngenta)	RL	1998				
Maize	T25	Bayer	TH(GA)	1998	2007			
Maize	MON810	Monsanto	RL	1998	2007	2003		
Maize	Bt11	Syngenta	RL+TH(GA)	2001	2007	2004		
Maize	NK603	Monsanto	TH(G)	2004	2008			
Maize	TC 1507	Dow - Pionner	RL+TH(GA)	2005	2008			
Maize	GA21	Syngenta	TH(G)	2005	2008			
Maize	MIR162	Syngenta	RL		2009			
Maize	MON810xNK603	Monsanto	RL x TH(G)	2007	2009			
Maize	Bt11xGA21	Syngenta	RL+TH(GA) x TH(G)	2009	2009			
Maize	TC 1507xNK603	Dow - Pionner	RL+TH(GA) x TH(G)	2008	2009			
Maize	MON89034	Monsanto	RL	2010	2009			
Maize	Bt11xMIR162xGA21	Syngenta	RL+TH(GA) x RL x TH(G)		2010			
Maize	MON89034xNK603	Monsanto	RL x TH(G)		2010			
Maize	MON88017	Monsanto	RC + TH(G)	2010	2010			
Maize	MON89034xTC1507xNK603	Monsanto	RL x RL+TH(GA) x TH(G)		2010			
Cotton	MON531	Monsanto	RL	1998	2005			
Cotton	LLCotton25	Bayer	TH(GA)		2008			
Cotton	MON1445	Monsanto	TH(G)	2001	2008			
Cotton	281-24-236/3006-210-23	Dow	RL+TH(GA)		2009			
Cotton	MON15985	Monsanto	RL		2009			
Cotton	MON531xMON1445	Monsanto	RL x TH(G)	2009	2009			
Cotton	GHB614	Bayer	TH(G)		2010			

*TH: Tolerance to herbicides, (G): Glyphosate, (I): Imidazolinones, (GA): Glufosinate Ammonium, RL: Resistance to Lepidoptera, RC: Resistance to Coleoptera

*TH: Tolerancia a herbicida, (G): Glifosato, (I): Imidazolinonas, (GA): Glufosinato de Amonio; RL: Resistencia a Lepidópteros; RC: Resistencia a Coleópteros.

The table does not include events under assessment or authorized for the production of seeds exclusively aimed for cultivation in export markets. In the case of the GTS 40-3-2, a Roundup Ready (RR) soy in Brazil, the crop was approved in 1998 and it but was afterwards suspended by a court decision in favor of the Brazilian Institute for Consumer Defense, but in 2005 it was finally authorized with the passing of the Biosafety Law.[76]

The first GMO planting approved in the region was Monsanto's glyphosate-tolerant Roundup Ready (RR) soy. The authorizations were granted in 1996 by the governments of Argentina and Uruguay, and seeds were then subsequently introduced illegally to the other countries of the region. In Brazil, in addition to RR soy, Bollgard cotton and GA21 maize were introduced illegally in 2004 and 2005 respectively, both from Monsanto.[77] In Paraguay, the organization Alter Vida estimates that there are around 8,000 hectares of GM cotton, even though it is officially still being assessed for approval.[78]

Governments have responded to this strategy of the illegal introduction of GM crops with policies that enshrine impunity. Instead of controlling and punishing those who have illegally introduced these crops, they have adapted their regulations to allow GM crops. In Brazil, one of the arguments used by the Ministers of State to push for the authorization of illegally introduced GM crops, was that they were already used in the country anyways.[79]

In 2010, the National Technical Biosafety Commission of Brazil (CTNBio) approved the commercial release of four new maize varieties (all with stacked traits), three soy, and one cotton variety.[80] This Commission has granted the largest amount of authorizations for commercial release in the region (27 GM events) (Table 2). In Argentina, not only were two new maize varieties authorized in 2010 for commercial release, but the production and exportation of GM seeds from unauthorized GM varieties became permitted.[81] In Uruguay, no new commercial releases were authorized, though five new maize GM varieties and two soy varieties are in the process , and testing of GM crops has been permitted. The National Biosafety Agency also authorized the production of soybean seeds for export with three new varieties that haven't been authorized yet for commercialization in Uruguay.[82]

How corporations, aid organizations, and other actors influence the GMO debate in the Southern Cone.

Biotech corporations have exerted their pressure in many ways. One of their tactics has been to put pressure on national Risk Assessment Commissions to authorize the commercial release of GM seeds. In Argentina, the technical institute in charge of these assessments and of advising the Secretary of Agriculture is the National Advising Commission on Agricultural Biotechnology (CONABIA). Representatives of biotech multinational companies that own the GMOs are members of CONABIA. For example, the Regulatory Affairs Manager of Dow Agrosciences and Syngenta's Director of Regulatory Affairs for Latin America participate as representatives of the Association of Argentinian Seed Producers. The representatives of the Chamber of Agricultural Safety and Fertilizers are Monsanto Argentina's Regulatory Affairs Manager and the Coordinator of Regulatory Affairs of Bayer CropScience, and the representative of the Argentinian Biotechnology Forum is a delegate from the biotech company Pioneer Argentina.[83] This means that

[76] *La situación de los Transgénicos en Brasil.* Gabriel Bianconi Fernandes, AS-PTA. August 2009.
[77] *Transgênicos no Brasil: un resumo.* Gabriel Bianconi Fernandes, AS-PTA. November 2009.
[78] www.cedaf.org.do/eventos/seminario.../**PARAGUAY**_HEBE.ppt
[79] *Transgênicos no Brasil: un resumo.* Gabriel Bianconi Fernandes, AS-PTA. November 2009.
[80] Information available at http://www.ctnbio.gov.br/index.php/content/view/12786.html
[81] Information from: http://www.minagri.gob.ar/SAGPyA/areas/biotecnologia/50-EVALUACIONES/index.php?PHPSESSID=500a0b50ac7a3766494b91051a87fa28
[82] Information from: http://www.mgap.gub.uy/portal/hgxpp001.aspx?7,1,144,O,S,0,MNU;E;2;2;12;5;MNU;,
[83] MAGyP, http://www.minagri.gob.ar/SAGPyA/areas/biotecnologia/20-CONABIA/membresia.pdf

representatives from Monsanto, Syngenta, Bayer, Dow and Pioneer are directly advising the government agency that makes decisions about the release applications that these same companies submit.

Brazil is the only country in the region where a Technical Commission (the CTNBio) has the power to make decisions related to the release of GMOs. The CTNBio is a group of scientists with expertise in different areas related to the release of GMOs, and is part of the Ministry of Science and Technology, but the links of several members of the CTNBio with agricultural biotechnology multinationals have been documented.[84]. Since the 2005 Biosafety Law extended the functions of the CTNBio and left decision making on GMOs (decisions made by a simple majority) in the hands of this small number of scientists, all applications for commercial release have been approved, and 25 GM crops have been authorized in the past four years (see Table 2). Former members of this Commission have denounced the pro-GM position of most of its current members and the lack of objectivity and ability to assess the risks of releasing this type of crop in the environment.[85]

The impact of GMOs on the environment, human health, and well-being of farmers and indigenous people.

The most important environmental impacts associated with the introduction of GM crops are related to the expansion of soy monoculture plantations. Two hundred million liters of biocides (including endosulfan) have been used on soy crops in the region, and 350 million liters of glyphosate have been sprayed on GM soy in the most recent planting season. This agrochemical rush has had consequences on the environment and health, especially impacting rural populations.

Particularly in Paraguay, there are many cases of massive intoxications due to the indiscriminate use of agrochemicals on soy crops.[86] In Argentina, as a result of the denunciations by the populations that suffer the spraying of the agrochemicals, a group of doctors and researchers has begun to establish health networks of Doctors in Sprayed Towns of Argentina. These health workers and researchers have documented the link between the increase of agrochemical sprayings to which some populations are subjected and the populations increased rates of cancer, miscarriages, fetal malformations, and respiratory conditions, among other impacts.[87]

The research conducted in Argentina about the impact of glyphosate on embryo development has triggered great controversy in the region. Andrés Carrasco, a professor of embryology at the Buenos Aires University School of Medicine , and a renowned researcher in the area, confirmed the lethal effect of glyphosate on amphibian embryos. [88] In response to the findings by Carrasco, several companies, media outlets, and policy makers reacted strongly. They started a campaign in defense of agrochemicals, saying that[89,90] glyphosate – a key element in the economy of the GM crops that have been engineered for tolerance to this herbicide – is not dangerous. Additional

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[84] *A ciência segundo a CTNBio.* Revist Sem Terra Nº 53, November 2009, available at: http://boletimtransgenicos.mkt9.com/registra_clique.php?id=H|65072|15226|8993&url=http://www.mst.org.br/sites/default/files/A_ciencia_segundo_a_CTNBio_REVISTASEMTERRA.pdf

[85] *Apontamentos sobre a legislaçâo brasileira de biosegurança.* A. Lazzarini Salazar, K. Bozola Grau. AS-PTA. May 2009.

[86] *Capitalismo agrario y expulsión campesina – Avance del monocultivo de soja transgénica en Paraguay*. T. Palau. CEIDRA, 2004.

[87] http://www.reduas.fcm.unc.edu.ar/declaracion-del-2%C2%BA-encuentro-de-medicos-de-pueblos-fumigados/

[88] **Pagannelli A, Gnazzo V, Acosta H, López S, Carrasco A, 2010.** Glyphosate-Based herbicides produce teratogenic effects on vertebrates by impairing retinoic acid signaling. *Chem. Res. Toxicol.* Published on the internet, August 9th, 2010.

[89] *Lo que sucede en Argentina es casi un experimento masivo.* Interview by Darío Aranda to Andrés Carrasco in the daily newspaper Página12, May 3rd, 2009, available at: http://www.pagina12.com.ar/diario/elpais/1-124288-2009-05-03.html

[90] *El otro caso Carrasco.* Article by Matías Loewy in Newsweek Argentina, November 25th, 2009, available at: http://www.radiocultural.com.ar/index.php/noticias/266-el-otro-caso-carrasco.html

debates center on agricultural ecosystems management and their degradation as a consequence of the cultivation of herbicide-tolerant GM crops.

The massive application of glyphosate has started to show its effects via the development of tolerance in several weed species.[91] In Brazil, Embrapa researchers reported glyphosate-tolerance in nine species, four of which are weeds that can pose serious problems for crop yields.[92,93]

Every year, more than 200 thousand hectares of native forests in Argentina are deforested as a result of the expansion of the agricultural frontier, mainly in the form of soy monoculture plantations. Thousands of peasants are displaced from their lands. The Peasant Movement of Santiago del Estero (MOCASE) and the Indigenous-Peasant National Movement (MNCI) constantly denounce the persecution of peasants for staging resistance against their eviction from their lands to make way for soybean plantations. The struggle by peasants and indigenous communities against evictions and displacement and the logging of native forests has been criminalized, and many of them are facing criminal trials.[94]

In the case of maize, one of the consequences of the release of GMOs that is having rapid impact is genetic contamination. Studies conducted in Brazil,[95] Chile,[96] and Uruguay[97] recently showed the presence of transgenes in conventional maize as a result of unintentional crossbreeding with GM maize. These studies show that the isolation measures established in the regulatory frameworks of the different countries are not enough to avoid contamination. The concept of "regulated coexistence" between GM crops and non-GM crops is often cited in biosafety policies. However, the results of these studies show that coexistence is not possible in the case of maize.

The history and successes of the anti-GMO movement.

There are several networks of organizations in the region that resist the imposition of GM technology. Even so, the process of resistance continues and has given visibility to the issue and generated debates among the public, despite the fact that the centers of economic power and the governments generally are clearly pro-GMO. Currently, the debate on GM technology goes hand in hand with the debate about the advance of agribusiness at the cost of peasant and family farming. The privatization and concentration of the whole agro-food chain in a few hands is what is at stake, and in this context, GMOs are a tool used by corporations to take control of plant genetic resources. Also, GMOs increasingly concentrate corporate power over the production of seeds.

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[91] *Argentina: las consecuencias inevitables de un modelo genocida y ecocida.* Biodiversidad sustento y culturas Magazine, August 2009, available at: http://www.biodiversidadla.org/content/view/full/50874

[92]Review of potential environmental impacts of transgenic glyphosate-resistant soybean in Brazil. Cerdeira et al, 2007, available at: http://www.informaworld.com/smpp/content~content=a779480992

[93] Buva "transgênica" resiste ao glifosato. Gazeta do Povo, December 1st, 2009. http://portal.rpc.com.br/jm/online/conteudo.phtml?tl%3D1%26id%3D950000%26tit%3DBuva-transgenica-resiste-ao-glifosato

[94] *Expansión de los agronegocios en el Noroeste argentino*. CAPOMA-DD.HH., La Soja Mata, Chaya Comunicación. July 2009.

[95] Study conducted by technicians from the Parana State Secretariat for Agriculture and Supply (Secretaria Estadual de Agricultura e do Abastecimento do Paraná). Presentation by Marcelo Silva at a Seminar on the protecton of agricultural biodiversity and the rights of farmers, August 25th, 2009, Curitiba, Brazil.

[96] Study by Fundación Sociedades Sustentables financed by the Heinrich Boell Foundation through the Sustainable Southern Cone Program. See article at: http://www.rebelion.org/noticia.php?id=75176

[97] **Galeano P., Martínez Debat C., Ruibal F., Franco Fraguas L., Galván GA, 2011**. Cross-fertilization between genetically modified and non-genetically modified maize crops in Uruguay. *Environ. Biosafety Res.* DOI: 10.1051/ebr/2011100. Available at: http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=8240065

In Brazil, the Campaign for an Ecological Brazil Free from GMOs and Agrotoxics (Campanha por um Brasil Ecológico Livre de Transgénicos e Agrotóxicos) gathers several peasant and civil society organizations that constantly denounce the damaging effects of this technology.[98] This network has managed to advance the issue of GMOs in the public debate agenda; it has forced the Brazilian government to bring transparency to the process of GM assessments. It is mainly thanks to their work that GM foods are labeled in Brazil - something that is not required in the other countries of the region.

In Argentina, in addition to the peasant struggles against the expansion of the soybean agribusiness complex, there are groups that focus on denouncing the damage caused by the GM technology, in particular the impacts of agrochemical sprayings, an example of which is the National Network of Environmentalist Action (RENACE).[99] In Uruguay, there have been joint initiatives by farmer and neighborhood organizations that aim to establish GM crop free areas. These initiatives have promoted legal actions against the establishment of GM crops in certain areas, and their pressure has resulted in the establishment of Special Commissions to study land use in the southern region of the country. This movement has been backed by the Agroecology Network of Uruguay which coordinates the efforts of farmer and civil society organizations at the national level.[100] Currently, there is an agreement between REDES-FoE (Red de Ecología Social--Network of Social Ecology/Friends of the Earth) the University of the Republic and the main family farmers' union in the country, CNFR, to monitor the contamination of non-GM maize. These types of agreements have allowed the organizations to involve relevant actors in the discussions surrounding GM crops and our land.

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[98] Information about the campaign at: http://aspta.org.br/campanha/
[99] Website: http://renace.net/.
[100] Information about Uruguay at: http://www.redes.org.uy/category/soberania-alimentaria-y-transgenicos/.

A. The Americas

LATIN AMERICA
Unfulfilled Promises of GMOs in Latin America

*Marcelo Viñas, Conservation Land Trust, Latin America**

Since the mid-1990s, commercial genetically modified (GM) crops expanded throughout several Latin American countries, becoming the major agents for the spread of industrial farming in the region. Nowadays, it is the second region with the largest area cultivated with genetically modified organisms in the world, with over 46 million hectares mainly in Brazil, Argentina, Paraguay, Uruguay, Bolivia and Mexico. Anglo-Saxon America leads the list with 72.2 million hectares.

GMOs in Latin America

Although there is an extensive variety of GM crops in 12 Latin American countries, the most widely planted are glyphosate-tolerant Roundup Ready (RR) soy, Bt corn and herbicide resistant or tolerant corn. GM varieties of pineapple, papaya, banana, potato, rice, alfalfa, eucalyptus, pine and, sugar cane are also being grown or assessed on a smaller scale.

Since the introduction of GMOs in the region, the ecosystems, the native and farmers' way of life and the traditional production of meat, grains and fibers have been devastated, with millions of hectares in the hands of multinational agricultural companies. Both GM soy and corn are mainly used for the production of forage and biofuels and, on a smaller scale, for human consumption –in the form of oil and emulsifiers.

Industrial single-crop farming is eliminating biodiversity turning woodlands, savannas and pasturelands into green deserts. Fertile land, that produced healthy and varied foods, is now used as fertilizer for extractive agriculture. The system consists of using a hydroponic method on a massive scale, sacrificing ecosystems and local communities in favor of economic growth without development, subsidized by fossil fuels through excessively simplified agricultural systems. Simultaneously, vast areas of land are becoming depopulated, leading rural population to migrate to the big cities and nearby wealthy countries, further devastating rural life.

Myths and truths about GMOs

For years, biotech corporations have been using a variety of arguments to defend GMOs. Some of these are repeated without contemplation, while others were changed to more elegant arguments. According to the latter, crops will: reduce the use of agrotoxics, bring down the cost of fertilizers, reduce environmental problems by decreasing the ecological impact of industrial agriculture, help mitigate climate change by reducing greenhouse gas emissions, contribute to the efficient production of biofuels, help replace oil by-products, increase productivity by strengthening food safety, contribute to fight against European subsidies and, in addition, end world hunger.

This claim, truly cynical in a world immersed in food crises and humanitarian catastrophes, has been shifting since 2005 towards the idea that GMOs would end world poverty. Acknowledging that hunger is not a result of shortage but rather of a poor food distribution, biotechnology supporters claimed that agro-industrial chains would provide employment to the poorest sectors of society, and that economic growth would create development. It is clear that these arguments, used to achieve social acceptance of GMOs, are at odds with the terrible reality created by their cultivation in Latin America.

Reducing the use of agrotoxics

The cultivation of GMOs did not reduce the use of agrotoxics. Conversely, it was increased. One example is RR soy, one of the main GM crops in Latin America resistant to glyphosate. In

Argentina, between 1996 - when RR soy was introduced- and 2006, the use of glyphosate went from 20 million to 180 million liters and it is estimated that this figure currently far exceeds 200 million. Equivalent figures are found in the rest of the soy producing countries of the region.

The cultivation of RR soy is part of a 'technological package', which includes GM seeds, glyphosate and direct sowing methods. With this system, the farm work for the soil during the preparation of the land and the sowing is unnecessary, reducing fuel costs and requiring fewer workers. With no need for earlier ploughing, weed control before sowing is carried out with chemical fallow. At this stage both glyphosate and herbicides are used to achieve efficient weed control before sowing the soy. Farmers frequently use a mixture of glyphosate with 2,4-D. Meanwhile, direct sowing creates humus in the soil, causing the appearance of invertebrates - which had never been a problem – creating a new agricultural pest. Woodlice and slugs are killed with new agro-toxics.

In addition, RR soy has no resistance to insects that traditionally attack crops. Thus, the same insecticides are used in the same quantity, among which endosulfan, Cypermethrin, chlorpyrifos, deltamethrin and 2,4-D are frequently used.

Growth of resistant weeds

The reductionist view on the development of a GMO and its massive release on the land is limited when the biological diversity of pests finds natural solutions for biotechnological control. The cultivation of Bt corn over millions of hectares for over a decade is the main reason for the increase in pests resistant or tolerant to the toxin produced by this GMO.

In addition, single-crop farming favors the spread of new pests. Asian soy rust damage on RR soy crops in the Southern Cone reflects an evolution consistent with the expansion of the crop.

One of the consequences of overusing the same herbicide over a long period of time is the appearance of resistances and tolerances in weeds. This is because these species are subjected to an accelerated selection process through a natural selective pressure. At least 8 species of glyphosate resistant weeds had already been found in Northern Argentina by 2005. However, the worst news for the country's agriculture was yet to come, when the first signs of resistance to glyphosate were found in the worst weed in Argentina's agricultural history: Johnson Grass. This fact led to different scenarios: from the massive loss of entire crops to achieve efficient control, to the use of obsolete herbicides, with higher levels of toxicity than glyphosate.

Tolerances are eliminated by increasing agrotoxic quantities. Therefore, even when the price of a herbicide decreases due to fluctuation in international oil prices - herbicides such as pesticides and fertilizers are chemical by-products of oil -, and not, as maintained, because of the use of GMOs, the increase in the amount of agrotoxics-caused by the growth of tolerant weeds - and the need to resort to obsolete toxics, threatens farmers' expenses and destroys their saving potential.

Biotechnology does not reduce environmental problems

The cultivation of RR soy increases the use of glyphosate. Sometimes up to 8 liters of commercial formulations can be used per hectare. This massive release - carried out by air and/or by land - entails numerous contamination problems such as agrotoxics seeping into groundwater or drifting into surface waters. Various studies show that in the quantities used in fieldwork, commercial formulations have an impact on the phytoplankton and zooplankton populations in freshwater bodies, seen in the change in the population structure of these organisms. Glyphosate - both pure and in commercial formulations -, causes malformations and the subsequent death of amphibian larvae. Due to a decrease in certain species, changing the population structures has altered trophic levels in the ecosystem. Similar impacts can be found in other sea organisms.

Conversely, it is important to stress that in the main soy producing provinces in Argentina, rural doctors noticed an increase in different types of skin and respiratory conditions, reproductive health disorders (a decrease in sperm count and function, premature puberty in boys and girls, an increase in the appearance of breast, prostate and testicular cancers and in malformations linked to

hormonal problems) and central nervous system disorders. In certain areas 12 malformations for each 250 births were reported. Various researches suggest that glyphosate, both pure and in commercial mixtures, is teratogenic - thus creating malformations -, in smaller quantities than those used in the environment.

Added to the contamination problems caused by glyphosate are those provoked by agrotoxics required to fight organisms that attack crops.

The increase in the use of pesticides has been the cause for the disappearance of a vast number of bees. Nowadays, there is great concern about the dramatic decline in bee populations due to the lack of plant species to feed on. It is important to remember that bees not only produce honey, but also carry out the important task of pollinating 90% of the crops. It would be safe to say that pesticides have put both bees and our food chain in danger. In the meantime, apiculture has been displaced from agricultural areas to marginal regions where cattle are currently produced.

Deforestation

Other environmental problems stem from the intensification of industrial agriculture caused by GMOs. RR soy expansion in Argentina, Paraguay, Brazil, Bolivia and Uruguay is achieved through the deforestation and transformation of meadows. During the 2004-2005 harvest, 1.2 million hectares were deforested in the Brazilian Amazon. In Argentina, over 1 million hectares of the Chaco forest were deforested in 4 years. In Bolivia the figure is 700,000 hectares. This process continues to spread.

The loss of biodiversity in devastated forests is devastating and the lack of studies on the subject alarming. There are only a few reports recounting the brutal changes in biodiversity when a forest is transformed into a single crop. Many of the disappearing species are used by the locals to procure construction materials, meat, fibers and other non-timber products.

Loss of soils

Some of these forests grow in semi-arid climates and the soils are poor. After 5 years of cultivation, these soils require chemical fertilization to maintain the yields. The complete clearing and loss of tree cover speeds up the oxidation processes in the soil, causing it to rapidly lose its organic matter. In addition, a water imbalance occurs when the trees that pump water from the depths of the soil disappear. This could cause the groundwater to rise and salinize soils, with disastrous consequences for both agriculture and the future restoration of natural ecosystems.

The loss of forests is associated with the intense process of wind and water erosions as well as the loss of ecosystem services. Controlling floods is one of the main functions of forests developing in areas with marked seasonal fluctuations. Floods that cause deaths and material losses in Latin American countries such as Argentina and Brazil are directly related to the disappearance of forests.

However it is not only soils obtained through clearing that are rapidly becoming exhausted. In Argentina, the negative balance of nutrients after each harvest affects almost all soils, even the best in the pampas region. Official estimates show that year after year only 30% of the nutrients extracted by the crops are replaced with chemical fertilization. The loss of fertility is often disguised thanks to the ability of the soy plant to absorb nutrients, even from an impoverished soil. 70% of the nutrients delivered by the soil per year are equivalent - if these were replaced with chemical fertilizers- to 15 to 20% of the total turnover. But this is not the only subsidy that the environment provides the RR soy business.

Environmental liabilities of a GMO

An approximate study carried out in Argentina shows that, just in terms of deforestation, the loss of the environmental service of carbon sequestration and storage, soil erosion and nutrient exports, environmental liabilities led to a loss of around 4,450 million dollars in the 2007-2008 crop year on a turnover of 21,000 million dollars. These costs, considered externalities - in other words liabilities

that are not recognized by companies but are absorbed by the state and society - represent a clear subsidy for the RR soy business, without which there would be no profit return.

Ecological footprint and the mitigation of climate change

It is clear that the ecological footprint of industrial agriculture is not reduced with the use of GMOs, but hides behind speculative numbers that businesses and states assess in their accounting, in their economic growth estimates and in the Gross Domestic Product (GDP) increase.

The disappearance of forests, the loss of organic matter in the soil, nitrous oxide emissions from the accumulation of nitrogenous fertilizers in the direct sowing method and chemical fallow for winter weeds, amongst other problems, increase Greenhouse Gas (GHG) emissions. Thus, GMOs do not mitigate climate change, but in fact contribute to global warming.

Genetic contamination

Despite the limited independent research on this subject, cases of transgene introgressions via pollination in native corn have been reported in Mexico, where one of the largest banks with varieties of this species is kept. It has been proven that besides corn: potatoes, tomatoes, cassava, cotton, sunflowers, colza and other species can also transfer their genes to native varieties through natural hybridization.

GMOs do not increase productivity nor strengthen food safety

Recent studies prove that GMO corn, soy, cotton and canola crops yield less than the same non GM varieties, in some cases producing as much as 10% less. But if they do not increase productivity, why are they promoted? Clearly, GMOs are sold by companies for two reasons: they simplify cultivation and ensure the use of herbicides manufactured by the same companies.

As seen, the productivity of GMOs is masked by huge energy, environmental and social subsidies. In countries where RR soy and GM corn are grown, there is an increase in the production scale to ensure the profitability of the business, and land allocated to other productions for the cultivation of GMOs is converted.

With an increase of the cultivated area, livestock, milk, fruit and vegetable production disappears. In the last ten years, Argentina has lost around 60,000 rural farms, representing a 25% decrease, while the average size of these increased significantly. The disappearance of medium and small farms devoted to food production represented a major deterioration in food sovereignty and a rise in consumer prices. Due to the uncontrolled development of GMO industrial agriculture, in the last four years, Argentina has lost 10 million head of cattle, almost 18% of the cattle stock in 2006 and the price of beef trebled in less than two years, increasing the price of chicken and pork.
The growth in scale has also increased the use of machinery and lowered the demand for human labor. In Brazil, for instance, for each job generated by RR soy cultivation, 11 workers from other productions are rejected from the work market. In Argentina only two people are needed to work on 1000 hectares.

In the regions where GMO crops expand at the expense of deforestation, many indigenous and rural communities are violently driven out of the lands they traditionally occupied. In many cases this happens with the collaboration of public security forces aligned with powerful sectors.

The unemployed and excluded migrate to the big cities in search of employment opportunities, widening urban Latin America's poverty belt. The humble dignity these people had in their rural environments is quickly lost in the crowded, unhealthy, promiscuous and miserable world of urban slums.

Usually these people need food assistance from the state. Paradoxically, the food is often produced with the same GMO seeds that drove them out. The people forced out by GMOs are literally given fodder for pigs and birds, sometimes elegantly disguised. Argentina's Ministry of Health banned the

use of the term 'milk' for soy milk in 2002, contraindicated its use for under 2 year olds and advised against it for under 5 year olds. However, public non-profit and religious organizations still offer the so called 'mechanical cows' in the poor regions of Argentina and neighboring countries. These machines roughly process the RR soybean to extract the milk and then hand it out free of charge in school and communal dining rooms.

Social costs due to the rise in unemployment, enforced migration and general assistance to the poor must be added to the aforesaid environmental subsidies. In short, the huge socio-environmental GMO production cost to supply international markets is taken on by Latin American societies to the detriment of biodiversity, the quality of life of their people and their future. Meanwhile, the countries largely committed to the expansion of GMO crops continue to intensify this model.

With the promise that GMOs would be able to fight against European subsidies, they in fact do this at the expense of huge environmental and social subsidies, leaving a true mortgage on Latin American productive land. Unfortunately, the leaders are blind to this situation, thus jeopardizing future generations.

The production of biofuels and knowledge-based bioeconomy

The emergence of the biofuel market added to this devastating picture. As well as intensifying GMO cultivation, deforestation, environmental liabilities and creating greater social problems, biofuels are in direct competition with food production, destroying lands that are suitable for its cultivation and increasing prices. Biodiesel (from RR soy oil) and bioethanol (from GM corn) are affecting millions of hectares that are no longer used for food cultivation or cattle breeding.

In turn, the possibilities opened by new European and local markets stimulate the development of new specific GMOs for the production of biofuels. Amongst these, the most prominent are several sugar cane events - the most efficient crop in bioethanol production - and the development of genetically modified trees to obtain second generation biofuels.

It should be made clear that biofuel production is not neutral in terms of carbon emissions; many studies prove that its energy efficiency can be negative. Also, this type of production is unsustainable, releasing GHG into the environment.

Alongside the 'biofuel fever', a new trend emerged, the so-called 'bioeconomy' or 'knowledge-based bioeconomy' (KBBE). This new economic movement predicts that the combination of biotechnology, Communication and Information Technologies (CIT) and industrial agriculture will be the source of all raw materials currently obtained from oil, ranging from plastics to organic solvents. If insanity were listed on the Stock Market, bioeconomy advocates would now be multimillionaires. On a planet where sustainability is fading - according to conservative calculations it would take1.3 years to replace the natural resources used in one year and recycle the waste generated within that time -, the bioeconomic model is a joke. Assuming that people still need to eat, where are they going to find the land to apply the bioeconomic model? How will the existing forests and meadows be preserved? Where will the waste from such a development go? Clearly, for these people, the source for all of this can be found in the vast unpopulated areas of Latin America.

GMOs would end world hunger and poverty

Latin America, with a low population density, would be in a position to generate healthy food for its entire population as well as surpluses for other regions of the planet. However, huge parts of the population live under the poverty belt, with no signs of improvement in the near future. Regardless of their political direction, the majority of governments in the region are subject to economic globalization and leave the future of agricultural systems in the hands of the most reductionist biotechnologists. In fact, exports in Latin America's main countries, including those with a greater economic growth in the last decade, increased thanks to primary products and to the detriment of the industrial transformation of raw materials.

The key players in the development and commercialization of GM crops are multinationals such as Monsanto, Syngenta, Bayer, Dupont and Dow Agroscience, either independently or allied with local companies. In addition, these companies are supported by governments through universities, research centers, national institutions and public bodies with whom they reach strategic agreements. Thus, many local scientists put all their efforts into the development of GMOs, as part of research channels funded by the companies in agreement with their institutions or universities, with the promise of sharing patenting profits.

Debates on different types of GMOs rarely go beyond NGOs and activists raising their voices and denouncing the effects of biotechnology. The impact of these actions is, with a few exceptions, almost non-existent in Latin America, and does not reach most citizens, let alone governments. On the other hand, the arguments used by activists are quickly taken by biotechnology advocates and companies who incorporate them, making empty statements in their new reports and advertising campaigns.

Governments who reap the benefits of income from the commodity trade openly express their commitment to intensify the application of biotechnology. In practice, this situation has led to fewer controls for new release events and put pressure on the technical committees making the assessments. Many former managers of these multinationals are now in official positions. Conversely, it has also led to a reduction in the legal restrictions that authorize seed patenting.

The paradox is that while in the last 500 years Latin America has been the source of scores of food species on a global scale (corn, potatoes, tomatoes, pumpkin, cocoa beans, beans and other species), it has a low population density and has been inhabited en masse by cultures who over 1000 years ago cultivated in extremely adverse environments, such as the arid Andes, with farming terrace systems and complexly engineered irrigation networks. But today its natural and agricultural biodiversity is being destroyed and surrendered to a handful of multinationals. 5000 years of agricultural history are being dissolved, further driving its inhabitants to humiliation and dependency.

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www.theconservationlandtrust.org/

IV. VOICES FROM GRASS ROOTS

B. Europe

THE EUROPEAN NETWORK OF GMO FREE REGIONS

*Maria Grazia Mammuccini, Navdanya International**

In recent years, regional commitment has been fundamental to avoiding the spread of GM agricultural cultivations in Italy. Almost all regions in our country have stood up against GM crop cultivation and, through an alliance with social, environmental and economic anti-GMO networks, they have contributed in determining Italy's choice relating to agricultural policies which, even at the European level, remained always strongly against the introduction of transgenic cultivations. Regions also played a fundamental role in Europe in respect to regulations related to GM crop cultivations directly through the Network of GMO Free European Regions. As such, institutional choices have matched citizen opinion, with a vast majority having always stood against GMOs, remaining strongly attached to an agri-food system born out of culture and local traditions, allowing for the expression of an enormous heritage in both wine and food renowned worldwide.

In 2000, Tuscany was the first region to adopt a law which prohibited the cultivation of transgenic crops in its territory, simultaneously achieving a system of integrated checks between agricultural, environmental and health related aspects supported by public sector scientific institutions independent from the multinationals' system. This choice was motivated by the peculiarity of Tuscany's territory, the 90% of which is made up of hills and mountains and where agricultural firms are predominantly small-scale. It is here that the industrial agricultural model witnessed a crisis even sooner than other areas, proving its failure not only from an environmental perspective but more importantly from an economic and social one. Beginning from the 70s, the lack of satisfactory incomes led to a progressive withdrawal from the countryside and a reversal of this trend only came about with a shift towards an agricultural model that was more suited to Tuscany's reality. This shift began in the mid-nineties, with the return to agrarian systems tailored around local production and consumption, respect of food sovereignty and of rural customs and to the promotion of biodiversity, with the adoption of a law, in 1997, for the protection of local species and varieties.

These results provided the chance to build a sustainable agricultural model as an alternative to the industrial one with GMOs as its ultimate expression, opening the way for initiatives of wider scope than a regional one opening the way to the creation in Tuscany of several international initiatives, such as the International Commission for the Future of Food and Agriculture and the European Network of GMO-free Regions and Local Authorities; such initiatives further strengthened a broad based movement between Institutions and civil society cooperating to protect the environment, health and rural economy.

The need to initiate a common action between different European regions on the issue of GMOs in agriculture became apparent during 2003 when, after the release of the EU regulatory scheme

which in practice ended the moratorium period for the authorization of new GMOs in Europe, the European Commission ratified the principle of coexistence between conventional and transgenic cultivations, reducing it to the individual choice of farmers, hence limiting national and regional political action on a subject that was far from having reached a conclusive agreement over the possible side effects of such biotechnological applications.

This move entailed a risk for all those areas where, much like Tuscany, the agricultural policies had turned towards the promotion of the area's own agrarian and food identities, recovering the vast heritage of local varieties, counting on organic cultivations and promoting agriculture's multifunctional role as an activity that can protect and give value to the environment; this shift concerned many regional governments that had invested in this strategy for years, through both their own and European financial resources. The introduction of GMO products would have once again put forward an opposite model of agriculture strongly oriented towards homogenization of agrarian cultivations and food with a direct and indirect impact on the income of farmers and on European agri-food networks.

The other fundamental risk that many European regions had identified was how to apply coexistence while guaranteeing the precautionary principle within the rich variability of European rural territories, both in terms of production systems and size of farms, not over 10 hectares in most cases. If in addition one were to take into account a combination of gene transfer through pollens along with the possibility of accidental presence of GMOs in the fields and inadvertent contaminations, the picture would be so complex to actually make it impossible for the precautionary and prevention principle to be respected together with the application of industrial coexistence.

Given these considerations, the regions of Tuscany and Upper Austria were the first to identify the possibility of an initiative originating from the local context, launching a political platform for allowing European regions the choice to keep their territories GMO-free, implementing the precautionary principle and keeping in line with their own peculiar economic and environmental features. These regions had in fact already developed a distinct sensitivity on the issue which had materialized in regional regulations that excluded transgenic crop cultivation.

On 4th of November 2003 eight European regions aligned with Tuscany and Upper Austria to support a hearing over the issue of GMOs and coexistence within agrarian production at the European Parliament. An initial common bill was drafted around a few fundamental tenets: clearly identifying responsibility in the event of contamination; maintaining seeds free from contamination and, most importantly, ensuring the possibility of keeping regional territories which had invested towards quality and environmental sustainability of agricultural production GMO-free.

A milestone for the network was the February 2005 Conference in Florence, where 20 regions signed the *Bill of Regions and Local European Authorities on the issue of coexistence between GMOs, conventional and organic agriculture*, known as the "Florence Bill" which to date is the document to undersign in order to join the network.

With the "Florence Bill" Regions identified a number of fundamental principles for their political and governmental action in respect to GMOs:

- To safeguard areas meant for certified quality production such as products of origin, organic productions as well as areas subject to binding provisions for biodiversity conservation, and to acknowledge the possibility for Regions to preserve their territory as GMO free
- To ensure the principle that breeding seeds be free from any contamination
- To safeguard biodiversity through conservation and enhanced value of local varieties and species and to avoid that such heritage become object of patents
- To ensure that procedures allowing GM varieties be subordinated to the principle of precaution and prevention and to the assurance that concrete positive effects would exist for consumers and for the broader common good.
- To envision a system of sanctions, in the case of coexistence, which defines costs and responsibilities of direct and indirect damages for those who caused them according to the principle that polluter pays.

On the basis of these fundamental objectives the Network of GMO-free Regions, aside from giving rise to a strong political-institutional alliance, also set in motion a technical – scientific sharing of acquired knowledge, availing itself also of the Network of Independent Scientific Labs that was created at the European level, allowing it to put forward amendments and corrections to documents during their drafting stage at the level of European Institutions' political bodies and to act as an direct interlocutor of European Institutions (Commission, Parliament, Committee of Regions) and of other organs (Assembly of European Regions – ARE, Copa-Cogeca, NGOs and professional Associations).

Together with the Regions several other local authorities, even if less structured, spoke out on the subject with different modalities according to each country; at present many provinces and municipalities in Europe have declared their territory GMO free, thus greatly contributing to the strengthening of the institutional network.

The creation of relationships and alliances between institutional networks and networks of citizens was particularly important especially in the most delicate stages of the debate and in framing the choices regarding GMOs within European institutions. The network of European GMO free regions took part with its own representatives in many of the initiatives of the European network against GMOs and viceversa, each time identifying common and shared objectives, hence making each other's political action more effective.

Within the institutional-movement relations, particularly relevant was the signing in 2007 of a declaration of intent based on the common principles related to the prohibition of GMO cultivations and the promotion of biodiversity and local production, between the Network of GMO Free Regions and the International Commission on the Future of Food and Agriculture headed by Vandana Shiva, which brought together an international network of movement leaders, scientists and experts in sustainable food systems.

The new European Union Recommendation of July 2010 granted more flexibility to the Member states in adopting coexistence provisions that, taking into account the environmental conditions at the local, regional and national level, provide the possibility to rule out GMO cultivation from large areas of their territories. This choice represents an important step forward and is also surely the result of cohesive political action between local institutions and movements which have progressed during these years.

Today, 55 Regions have joined the European Network headed by Paolo Petrini, the Minister of Agriculture for the Marche Region, who was also chosen in view of the commitment the region has always maintained against GMOs. Recently Regions have strongly demanded a European brand to offer consumers a guarantee on products being GMO free both for the agri-food productive chains and so to avail of non biotech feeds on the market. The commitment and primary goal of the Network remains the introduction of a legally recognized state of GM- free areas. Until today it hasn't in fact been possible to obtain this through regional and local regulatory acts and, despite the new European Union Recommendation of July 2010, a recent case in Friuli Venezia Giulia in Italy revealed the legal uncertainty that many European Regions, farmers and citizens still find themselves in.

It is instead paramount for everyone to ensure the fundamental democratic principle of freedom to choose governmental policies related to agricultural and rural territory in different European Regions, based on the principle of food sovereignty and security for all citizens.

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B. EUROPE

Genetically engineered agriculture - Monsanto's biggest defeat

*Benny Haerlin, Save our Seeds**

Genetically modified plants could be considered an endangered species within Europe, where they not themselves rather endangering biological as well as rural diversity. In 2011 only three member states of the European Union saw any planting of GMOs at all: Out of some 182 million hectare of the Union Spain with approximately 70.000 hectares is by far the largest GMO-grower, followed by the Czech Republic (3000 ha) and Portugal (500 ha). Not overly impressive for a "technology of the future" and the GMO acreage is even on the decline since 2008. Only two GMO events are presently approved for cultivation within the EU: Monsanto's "Mon-810" insecticidal maize, and a potato "Amflora" of BASF, Germany, which is supposed to ease starch processing for industrial use and presently accounts for 2 ha in Germany. "Mon 810", though officially approved by the Union, has since been banned for cultivation by Germany, Austria, France, Greece, Luxembourg, Poland, Bulgaria while Italy's GMO legislation at this moment does not allow for any cultivation of GMOs.

While GMO cultivation is "dead in the water" in Europe, still substantial amounts of GM soybeans and some GM maize is being imported as animal feed. Probably the only loophole left for the use of GM products on the continent. While all food and feed products containing or derived from GMOs are subject to mandatory labeling, animal products produced with the help of genetically modified plants need not be labeled. However, a so called positive labeling "produced without GMOs" has been introduced on major markets such as Germany and France and created increasing demand for non-GM animal feed. Milk, being the front runner, but also eggs, poultry and lately also pork are labeled "non-GMO" and command a small premium on the market. Also regional labels of certified origin usually guarantee non-GM fed produce as, of course do all organic products by definition.

Europe imports about 70% of all its protein plants for animal feed. Reduction of that deficit, which historically stems from the EU-US "Blairhouse agreement" that would prohibit European subsidies for oilseed and other protein cultivation, is an important topic on the agenda of the Common Agricultural Policy's reform. The fact that soybean imports are also a source of GMO intrusion is but one argument in this debate. Other arguments are about the impact on rainforests in Latin America but also the general detrimental environmental effects of Roundup-Ready monocultures around the world.

Why is the largest global importer and exporter of agricultural goods after the United States a lost battle ground for GMOs? Why have GMO producers given up on Europe at least for the next decade or so?

The first answer lies is the way Monsanto tried to introduce its GM soybeans to Europe in the first place. When Greenpeace blocked some of the first soybean shipments from the US containing GM soybeans in 1996 it conveyed two revelations to the general public: There is some fundamentally new and potentially dangerous food and feed product coming our way, nobody told us about and soybeans are an ingredient in about 60% of all processed food in the supermarket shelves and an

ingredient in almost all animal feed mixtures on the market. The simple message drawn from this was that a single US company was about to contaminate our food with highly suspicious and eventually dangerous new substances without asking permission or even labeling these new ingredients.

Debates about genetic engineering had so far been rather academic and theoretical disputes about whether or not to "play good" and eventually even release GMOs into the environment although there was no save way to recall them. However, these discussions were restricted to small circles between environmentalists, political specialists and scientists, some of them deeply convinced that genetic engineering was the sustainable way out of chemical agriculture.

Yesterday's disputes. When GMOs hit the consumer market and thus and public attention the right to choose and the right to know swiftly became the dominant issues. 95% of Europeans wanted GMOs in their food labeled, 65% said they did not want them in their food when Greenpeace in 1997 commissioned a first EU wide poll on the issue. Ever since a solid majority of European citizens, now regularly screened by the official European Communities' "Euromonitor" clearly reject GM-food. These days the level of rejection even raised to over 70%. When talking to European GMO-promoters the first thing they will try to assure you is "we are not like Monsanto". "Nothing is as tough as reverting a first impression", one of them told me years ago, "and Monsanto messed it all up. These guys sure know how to deal with farmers, they had no idea that you have to deal with consumers as well."

The second answer to the question why Europe is no place for GMOs so far, lies in the immediate reaction to the 1996 soybean disaster. The European Commission and Parliament reacted to the public outcry by swiftly enacting labeling laws. A first regulation in 1997 required any GMOs in food to be identified and labeled. A revised version of 2003 went even further and now requires also food to be labeled that does not contain DNA or proteins of GMOs but is derived from it, namely soybean oil, starch, sugar and other derivatives of soybean and maize. As a result, major food brands and industries as well as supermarkets made sure, none of their products would have to be labeled as GM.

Europe is an urban consumer market. In most countries farmers account for less than 5 percent of the population. Billions are spent to sell consumers all kinds of not so healthy and certainly not sustainable food products. Convenience rules and one of the key challenges in this highly saturated market is how to sell people more food than they can eat. Consumers certainly do not rule that game. However, when there are clear preferences and whenever there are manifest rejections of certain products, the highly concentrated yet competitive market will amplify such trends fast and reliably. Within two years, between 1998 and 2000 all major food brands and supermarkets in Europe adopted a clearly communicated non-GMO policy. For them GMOs did not promise any extra profits, nor did they hold any other advantages. Why should they step in for the agro-industries? Various attempts to break through this wall by organizing a concerted introduction of GM foods by key players failed, simply because there was no substantial incentive for the food industry, but yet a massive risk of losing customers. Their market research certainly did not buy the 70% rejection polls as reliable indicators of consumer behavior. However, focus groups and other in depth assessment of their customers reactions notoriously indicate that there are good chances to lose between 5 and 10 percent of them to gm-free competitors in addition to an overall loss to their positive image.

The introduction of GMO-free labels for animal products reassures brands and supermarkets as customers are willing to not only pay a small premium for such products, but also welcome the step as a move towards more sustainability and "greening".

When US-citizens are asked whether they wanted GMOs labeled in their food, the positive response is only marginally lower than in Europe. However, massive intervention from a united food and agribusiness lobby, which appears to be more powerful in Washington than in Brussels has prevented such labeling until today. This might be the most significant difference shaping the markets on the two sides of the Atlantic.

A third answer to this questions has probably been overemphasized by those frustrated by Europe's "GMO no thanks!" attitude. However it is true that most Europeans have a healthy deal of distrust in their own institutions as well as a somewhat skeptical attitude to scientific progress when it comes to enter their homes, especially their food. The first wave of GMO-disputes happened to take place in the aftermath of the mad cow scandal, which not least proved to be a communication disaster for food safety authorities as well as politicians, who all too long tried to play down the scandal, some for reasons of scientific dogmatism (it had to be a virus and such a virus could not be found) others, such as the infamous ag minister of the UK publicly feeding his daughter a Burger, for rather pragmatic economic reasons. The pictures of thousands of cows then burned and the helpless reactions of health authorities trying to explain their mistakes certainly did not encourage European citizens to buy the same authorities tales about the "safest food ever tested" and "no reason whatsoever to suspect that GMOs can be a threat to human health".

As a result of the massive political rejection of GMO food in the late 90ies of last century, also politicians of different color and in different regions of Europe started to disagree on the need and benefits of genetically engineered food and agriculture. This also resulted in clearly contradictory approaches of food and environmental safety authorities of different countries. As the initial European Directive regulating the approval and risk assessment of GMOs required these authorities to reach a common assessment those differences soon became apparent to the public and certainly reinforced their suspicions. The GMO-industry therefor considered it a major breakthrough when in 2003 a centralized system of risk assessment governed by a newly installed European Food Safety Authority (EFSA) was established.

Probably the pro GMO side inside the EU institutions as well as in academic and industry circles slightly overexploited that apparent victory by establishing a GMO expert panel charged with the unified risk assessment that is dominated by outspoken GMO proponents and never included a single scientist known for his or her critical approach on the technology or even the highly disputable and obviously narrow concepts of risk assessment. As a result, this GMO panel never even disputed the safety of any of the GMOs submitted for their assessment. In addition, EFSA's complete dependency on studies submitted to them and structural incapacity to conduct or commission any independent studies, which was even criticized by EU-Commissioners in charge of the institution, was not exactly helpful to build a reputation of trust and confidence. Finally, scandals around individual members and their affiliations, culminating in the panel's scientific coordinator moving directly to become Syngenta's representative for biotech regulatory affairs resulted in the panel today being perceived as a rubber stamping office for industry. Since then, the European Council of Ministers and the European Parliament and to a lesser degree also the European Commission, not to speak about those national authorities who's competence on the approval procedure has been largely reduced by the introduction of the EFSA panel went public

with doubts and criticism about the scientific credibility of the EFSA. Why should a skeptical public be impressed by such an institution?

Since more than 15 years now European institutions, industry and academics explain public rejection of GMOs as a result of poor understanding and lack of education. Millions have been spent by governments and the European Union to "communicate science" and educate the public about the safety of GMOs. Probably more jobs have been created in the PR industry than in seed development by the advent of genetic engineering. Certainly no other GMO industry has expanded as much as the testing-business, employed by food and seed companies to certify their products to be GMO free. However, a technology nobody wants will never be able to proof it was harmless, certainly not by commissioning studies and papers to exactly those people the public does not trust.

The failure of GMOs in Europe is finally fuelled by a broad consensus in society that patents on life are actually an assault against fundamental values it holds. Many believe that evolutions work cannot and must not be appropriated by smart scientists who happen to be the first to express certain of its aspects in digital terms. Many more are convinced that patents on plants, animals and DNA were an unacceptable attempt of but a few transnational companies to gain control over the very basis of our food and even our lives, an outrageous expropriation of obviously common goods. In many European countries the call to reject such patents is a common ground between all political parties, farmer's organizations, NGOs and churches. Stories about Pinkerton detectives hired by Monsanto to investigate farmers replanting seeds, fears that even GMO contamination could lead to license demands from their owners are well known, despite the fact that European Patent law at this point does not allow for similarly broad claims as the US patent system does and actually still plays no role for seeds. However, the seed industries late attempts to enforce replanting fees within UPOV's revised plant variety protection schemes, which includes increased controls over farmers seed use, has already brought farmers up in arms against a "big brother watching you".

To this background the history of the last 20 years of GMO approvals (the EU's first directive on the deliberate release of GMOs into the environment was enacted in 1991) in Europe can be depicted as a rare and encouraging example of successful and precautionary civil resistance. There are no bodies on the street, no major disasters as with other technologies, which have triggered this social movement or where tipping points of changing policies. There are however, some points and major battles between the pro- and the anti-GMO side, which have shifted the direction of policies.

The first GMO to be approved for commercial cultivation in Europe, a Bt-maize variety by Syngenta called Bt-176, was actually approved in 1996 with only a single member state (France) voting in favor of this approval. All others voted against of abstained. However, in these days the rules were such that only an unanimous vote of the Council of Ministers could waive the suggestion of the EU Commission to approve a GMO. Not exactly what ordinary Europeans consider a democratic procedure. After a few more GMO approvals in 1998, the Council of Ministers simply announced they would no longer implement the Unions rules until they would be seriously overhauled. This moratorium for all approvals of GMOs actually lasted until early 2004 when a new directive as well as regulations for labeling and traceability had been enacted. Quite a few GMOs have been approved for use as food and feed since. However, the BASF-potatoe Amflora, now

grown on 2 ha in Germany, approved in 2010 was the first and only GMO approval for cultivation since 1998, again, against a majority of votes within the Council of Ministers.

In 2005 a first European Conference of GMO free Regions was held in Berlin, Germany. Some 200 representatives from NGOs as well as regional governments, farmer unions, science and some GMO free industries attended the meeting and adopted a "Berlin Manifesto" claiming their right to decide whether or not GMOs would be planted in their region. A few month before more than a dozen regional governments had adopted a "Declaration of Florence" demanding the same right and forming a network of gmo free regional governments which has now grown to 54 governments and will soon welcome an additional 6 states from Germany. The broader network entails about 189 gGMO free districts and sub-regional governments and thousands of municipalities, which have taken decisions and adopted commitments to stay GMO free. Private contracts between famers complement this movement.

At the last European GMO Free Regions conference in Brussels the capital of Europe itself announced that it will join the network while representatives of major supermarket chains revealed new plans to also ban the use of GMO animal feed from their milk and meat products.

The new EU-Commissioner in charge, John Dalli, presented at the meeting a new legislative proposal to member states, which would allow them to ban the cultivation of GMOs on their territory. Discussions about the ways and means of these national bans, which would force national governments to actively defend the cultivation of GMOs against the majorities of their electorate, are still underway. Until the new law is enacted no new approvals for GMO cultivation are expected to threaten the consensus needed among member states and desperately sought be the EU Commission.

GMO free has become a must for high quality products and labels of origin. In many regions of Europe it has brought together farmers, institutions, NGOs and consumers in alliances which are now looking well beyond the single issue of genetic engineering. Among other issues on their agenda today are the expansion of energy plants, a threat to the regional farm structure in many areas of Europe, concepts of local marketing and joint efforts to reduce the dependency on imported animal feed, combined with climate action and measures to improve soil fertility and improved regional responsibility of the food and retail business.

While GMOs are no real success story in Europe, many governments as well as the European Commission are still far from acknowledging the fact that the majority of European citizens not only rejects GMOs and their producing companies but is also looking to alternatives of the agricultural concept of the last century.

"Knowledge based bioeconomy", kbbe, is a new buzzword in European research and development, heavily promoted by agro-industries as well as some chemical and energy companies. The end of the petrochemical age, so goes its narrative, requires new sources of energy and raw materials for industry from agriculture as well a new level of sustainability: Fully integrated biomass-production at low costs which can then be turned into food, feed, fibre and fuel at industrial "bio-refineries". Needless to say that in this strategy for a new wave of agricultural industrialization, genetic engineering again plays a pivotal role. Public investments in research and development programs to this end exceed research in sustainable agro-ecology and organic farming by magnitudes.

The present debate about the shape and the goals of the European Union's Common Agricultural Policy (CAP) after 2013 and it's "Greening" a well as it's new concept of "public money for public goods" is a welcome occasion to question this approach. Defending family farming, rethinking our level of meat production as well as the enormous imports of soybeans to this end, open new approaches to the issue for a broader public as well as more in depth discussions about the background and context of GMO production. For many campaigning organizations in Europe the CAP debate is therefore a priority for 2011 and 2012.

Probably the most serious threat to a GMO free Europe today is the industrial production of fuel and energy in agriculture for various reasons. First, a call for "GMO free fuel" is nothing that would resound easily with consumers and their considerations for healthy food. Second, the impacts of expanding monocultures of maize as the primary source of ethanol as well as "bio"-gas production increases the risk of pests, such as the maize-borers and rootworms, which present Bt-plants are designed to combat. Finally, highly subsidized fuel and energy production has triggered massive investments of industrial operators and institutional investors in agricultural industries and land, displacing family farmers and food production oriented farming. Such large estates, no longer embedded in the culture and more democratic decision making of villages and municipalities, will certainly be much more open to technologies such as GMOs and be as independent from customer preferences as Monsanto was when starting to introduce GMOs into Europe.

Resistance against these new forms of domestic land grabbing, however, is emerging. Protests against public money for private profits from ill devised "new oilfields" of is mounting and the public opinion against the "maizification" of traditional landscapes has started to express itself, especially in the countryside, where farmers unions start to warn against such an "Americanization of European Agriculture". Chances are that we might see field occupations and protests against this new concept of agriculture, which may remind Europeans of the field actions against GMO cultivation that had been important symbols of resistance against "Monsanto & Co" of the anti-GMO movement in many European countries.

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B. EUROPE

Network of European Scientists for Social and Environmental Responsibility and the Italian anti-GMO movement (ENSSER)

*Marcello Buiatti, Geneticist**

Two European scientific networks are based in Italy : the World-Wide International Society of Doctors for Environment (ISDE) and the European Network of Scientists for Social and Environmental Responsibility (ENSSER). The vast majority of ISDE members are doctors dealing with the effects of human technologies on health, studied from all points of view, from the epidemiological to the monitoring of chemical pollutants, biotechnologies and nanotechnologies. ENSSER is a young association of independent scientists and laboratories all over Europe that works mainly on the problems of GMOs.

Though only founded in 2009 in Berlin, ENSSER has now been joined by more than 100 scientists all over Europe, whose laboratories are mainly dealing with holistic GMO risk assessment and are studying the "unintended effects" of GMOs at the molecular, biochemical, and physiological levels, as well as their impacts on agro-ecosystems, the economy, and society. Based on scientific data obtained by its laboratories, ENSSER has been challenging the procedures and guidelines of the European Food Safety Authority (EFSA), the European Agency involved in food bio-safety risk assessment with particular interest in GMO products. ENSSER organizes at least one European meeting every year with the help of the European Agency for Environment in Copenhagen. Moreover, meetings also have been held at the European Parliament with the help of Corinne Lepage, President of the Committee for Research and Independent Information on Genetic Engineering (CRIIGEN), a French network led by Professor Gilles Eric Séralini. The most recent meeting was held at the University of Caen in March of this year and a book on GMO risk assessment will be published in the USA along with the proceedings of the meeting. (www.ensser.org)

The data obtained by ENSSER laboratories has been used in a series of discussions in European Countries with some success as in the case of two Monsanto products (Maize MON 863 and MON 810). Particularly, the CAEN and Florence laboratories analyzed the data reported in Monsanto dossiers on MON 863, with updated statistical methods. This opened a vigorous debate in scientific journals and offered scientific proof of the unintended effects of genetic transformation from the human health point of view.

The work of ENSSER laboratories can be a challenge due to the power of leading GMO producers (Monsanto, Dupont, and Syngenta) and their negative influence on the European Commission and some national governments. Referred to as the 'Three Sisters,' these corporations make it extremely difficult to obtain funding for research, as shown by the rejection of an ENSSER project on GMO risk assessment and instead the research being assigned to a group known to support GMOs. The editors of scientific journals in the area of plant molecular biology and transgenic research are often

biased in favor of the "Three Sisters." and make it difficult for ENSSER's data to be published in their scientific journals. For example, a paper on Maize 810 was submitted to "Plant Molecular Biology" showing that at least four unintended RNAs were synthesized putatively leading to the same number of proteins deriving from the fusion between pre-existing and transgenic DNA. This was neither described by Monsanto nor present in their patent description. We were asked to insert the words "but not necessarily undesirable" whenever the word 'unintended' appeared. Though the request was not followed and the paper still published, this is an example however of the bias of the editorial board of certain high level scientific journals. The opposition to independent laboratories also derives from the presence of pro-multinational representatives at agency commissions. One such example is that of a leading scientist of EFSA who left the Agency and immediately became the head of Syngenta's marketing department.
Finally, in several cases the pressure of the industry "sisters" can change the lives of the scientists who dare criticize GMOs. Dr. Arpad Pusztai and other notable scientists lost their jobs. Professor Gilles-Eric Séralini, was subject of a virulent personal and professional attack and the object of criticism in many French journals.

Successes of Europe's anti-GMO Movement

However, the battle in Europe is far from being lost, as shown by the fact that the opposition to GMOs, with the help of knowledge gained by scientists, has had some success and has led to changes in the opinion of EU leaders on the subject. The European Commissioner of Agriculture has opened the way to a change in European regulation, allowing single countries to forbid GMOs on the grounds of damage to local agriculture and possible danger to human health. Within GMO-Free Regions the incomes of small farmers have been increasing due to the high quality of local, traditional agriculture.

***Marcello Buiatti,** *scientist, since 1982 has held the genetics chair at the Università di Firenze. He is President of the National Association for the Environment and Labour dealing with risk assessment, bio-safety, environmental and social issues related to industrial, agriculture end health related production. His main scientific interests are genetic and molecular studies and mathematical modelling of developmental and evolutionary processes, the molecular analysis of stability and the interaction with environment and economy of GMOs.*

B. Europe

FRANCE
The fight against GMOs and Monsanto in France

*Jose Bové, European Deputy**

Unlike what their communications department claimed, the development of genetically modified (GM) seeds by multinational companies, in the early nineties, was not a response imposed by the fight against hunger in the world. Companies quoted on the stock market have no other obligations but what they owe to their shareholders: profitability, distribution of dividends and a return on investment higher than 15 percent per year. Monsanto, a biotechnology giant, is a sterling example of one such company. The systemic herbicide Roundup, developed by Monsanto, destroys all the plants with which it comes into contact. In other words, it is a complete poison. Since Monsanto obtained a patent on this herbicide, it has a monopoly on the production and marketing of this product.

Pressures exerted by Monsanto

Monsanto's development of GM plants in the late eighties was focused on controlling the sale of seeds and increasing the sale of its flagship herbicide-Roundup. The American company's research wing developped a corn variety that would be resistant to Roundup. This strategy enabled Monsanto to make a double killing: offer a technological fix which linked the sales of its seeds with that of its pesticides.

Thanks to the close relationship Monsanto and other big seed corporations (DuPont, Syngeta, Pioneer) maintain with the American government, they were able to first write and then impose a regulation that allowed the marketing of their new genetically modified seeds while bypassing the necessity to go through stringent toxicity tests. Moreover, they managed to succeed to get an important part of the "scientific community" to recognize the "substantial equivalence" principle, according to which GMOs are à priori as safe as traditional plants and can be used without any problems as food for both humans and animals.

Thanks to the easy going attitude of the American administration, Monsanto succeeded in inundating the North American market with GM seeds. The entry of genetically modified food into the American diet was so rapid that consumers were unprepared to react. Farmers were forced to give up some of their autonomy and self-sustaining practices by having to buy new seeds every year since Monsanto varieties are protected by patents. Monsanto even hired detectives who travelled the countryside to look for corn farms which may have been sown illegally, without paying royalties. The offenders were taken to court and more often than not ended up having to pay heavy fines.

Monsanto moves to Europe

After this lightning conquest of the American market, Monsanto's greed was very naturally directed towards the other credit worthy market of the planet, i.e. the European Market. In France, corn cultivation covers 3.5 million hectares and the seed market is the sizeable amount of about 600 million

dollars per year. Given the pressure exercised by the multinationals as well as their claims regarding the agro-economic advantages of their product (which by the way were not verified) the European Commission very soon approved the cultivation of a variety of corn developed by Monsanto. In 1998, the cultivation of MON 810, a corn variety which is resistant to pyrale (the worm of a butterfly variety) was put on the market.

This decision was surreptitiously taken without any political debate on whether there is a necessity to introduce biotechnology in Europe. Studies on the impact of GMOs on the health of consumers, on the environment and more particularly on micro-fauna were not considered in a more serious manner than those undertaken in the USA. Brussels just toed the line of Washington. No European political decision makers asked themselves the crucial questions: What is the use of GMOs? Who benefits from them? The scenario is set so that the same story as in the USA repeats itself.

The anti-GMO movement in France

However, the citizens of Europe have taken action to fight this logic . In January 1998, dozens of activists, belonging to the Confédération Paysanne, a union member of the European Farmers Coordination and of the Via Campesina, undertook their first civil disobedience action by destroying several tons of GM seeds, ready to be sold to corn growers in the southwest of France. This demonstration was instrumental in stopping, at the eleventh hour, the introduction of GMOs in France. Within a few days the debate on biotechnology, which had until then been restricted to a very limited circle (including political decision makers, heads of seed companies, scientists and agronomists) became a national issue and occupied the centre-stage of social and political public debates.

The French judiciary decided to prosecute the farm leaders who organized and participated in the destruction of GM seeds. This criminalization of an act undertaken by unions clearly indicated that the current government wished to impose GMOs. The case that followed was used by the accused and the Confédération Paysanne to strongly appeal to public opinion, which enabled an open debate on biotechnology to take place. The witnesses brought forward by the defense were scientists and farmers of other countries. Their testimonies were completely contradictory to the assurances of the companies, and presented a less rosy picture of the realities propounded by certain labs. They also showed that in many countries as in France, farmers were refusing patents on life. They were organizing to conserve traditional seeds that could be exchanged and to maintain their right to sow them again year after year. Suddenly, biotechnology was no longer only a simple matter of agricultural technology. It also encompassed the choices of society on such fundamental principles as patents on life, intellectual property, and the stronghold of companies such as Monsanto over the whole food chain, from the field to the fork, from the producer to the consumer. The fight became global and provoked discussions on the type of society and human health standards that France wishes to have, and the best ways to improve the nutritional status and food situation of southern countries.. All these were issues that Monsanto would have preferred not to ever be discussed.

In many other European countries, similar anti-GMO demonstrations were undertaken by activists representing farmers' unions, environmental protection groups and consumer movements. In the years

that followed, the destruction of trial fields kept increasing in France. Many trial fields were destroyed in non-violent and symbolic actions; this led to new prosecutions and levying of heavy financial fines as also, in some cases, imprisonment. These court cases opened up newer opportunities to raise public awareness. Gradually the name Monsanto, which was responsible for numerous trials, became synonymous with predator. Unacceptable previous actions, such as the role of this company in the manufacturing of Agent Orange and its mass utilization by the American army as a defoliant during the Vietnam war, deeply compromised the image of Monsanto as a responsible and environmentally conscious company, an image which it had sought to create. In the face of this systematic suppression, public mobilization did not weaken but on the contrary came out stronger.

In 2003, during a demonstration against WTO on the Larzac Plateau,activists opposed to the utilization of biotechnologies in agriculture, came together to create the Network of Voluntary Reapers (Réseau des Faucheurs Volontaires). Within a few months almost 8,000 people, cutting across various social and unionist backgrounds, pledged to participate in the destruction of plots of land where GM plants were growing.

According to the Charter to which these people adhered, these actions had to be of a non-violent nature. In addition to that, the signatories of the Charter acknowledged the importance to publicly take full responsibility for their actions in case they led to prosecutions; they also pledged solidarity with each other. In the years to come, this unique movement, organized as a network independent of trade unions and political parties, would prove to be particularly dynamic, creative, and efficient. The voluntary reapers exercised their pressure on different governments and on companies through their actions. In the summer of 2007, half of the trials for GM seeds undertaken in France, was destroyed. In 2008 several companies (including the French company Limagrain) declared that they were shelving their GMO development programme. The mounting public pressure was too strong. Public opinion was clearly in favour of the reapers.

Districts and villages very soon followed in the footsteps of the network's fight. Municipal councils voted for decrees banning the usage of genetically modified seeds in their district so as to protect the organic growers from the pollution arising from farm-to-farm pollination. The involvement of locally elected people helped the fight to cross to the next level.

These municipal decrees were to be made invalid by the administrative tribunals. However, the involvement of elected municipal members snowballed. The French regional governments started becoming aware of the fact that several standards of production such as the controlled origin appellation, were threatened and 21 out of 22 of them motioned for the ban of new seeds. Thus, the movement for the fight against GMOs and against Monsanto was steadily growing. Starting from the grass-roots (the consumers and the citizens), the movement was spurring local officials to publicly take a stand on the issue and in many cases, to personally take part in acts of destruction and be prosecuted as well.

The French momentum spreads throughout Europe

A new landmark was reached when, in 2005, a new European network of regions opposed to GMOs was created. This mobilization gave a new democratic legitimacy to the fight. The European Commission could no longer ignore it since some states such as Austria had voted for a moratorium de facto stopping the growing of genetically modified plants in their territory. In France, around twenty activists including José Bové launched a hunger strike in January 2008 to also obtain a moratorium against the cultivation of the only variety authorized in Europe: the MON 810 of Monsanto. After around 10 days, under the pressure of public opinion, the Right wing government finally broke down. Since then, there is not a single hectare of GM corn in France for human or animal consumption. *(www.infogm.org)*

This show of resistance took the European Commission by surprise so much that it no longer knew how to manage the biotechnology issue. Since the beginning of the 2000 decade, however, it did not stop its efforts in favour of the multinationals which grouped themselves around the international lobby ILSI (International Life and Science Institute); they also created an ad-hoc group the IFBIC, comprised of the main agro-industry companies (Monsanto, Bayer, BASF, Pioneer, DuPont). The senior management of European Research brought 8 million euros to finance programs such as ENTRANSFOOD, the aim of which was to think out a new public relations strategy to facilitate the entry of GMOs in Europe and to change the perception of citizens and consumers.

In spite of this financial and political support, poll after poll showed that European consumers continued to be fiercely opposed (65 percent) to the introduction of GM plants in food.

The struggle started in 1998 had blocked the machinery. In December 2008, the Environmental Ministers of 27 member states asked for a complete revision of the evaluation procedures of GMOs as well as a recasting of the European agency for Food Security, responsible for giving scientific opinions on new genetically modified varieties.

Over the years the negative consequences of GMOs around the world became more and more apparent. Even the most radical and inflexible supporters of biotechnology cannot afford to deny them. In the USA, Monsanto's Roundup resistant weeds are becoming an environmental and economical scourge. The rare plants which survived the spraying of Roundup transmitted their traits to their descendents. Some like the amarantha palmeri have become so invasive that the corn and soya growers are left with no other choice than to proceed with extremely costly and labour intensive manual weeding or to use other herbicides. The promises made by Monsanto and other multinationals have been shown to be unfounded and false.

The struggles undertaken in France and in Europe were successful. Thanks to social mobilization the powerful agro-industries were defeated. A battle was won but this in no way made Monsanto, Bayer, or BASF give up their projects.

On the one hand, Europe allows the import of many varieties of genetically modified plants (corn, soya) as livestock feed. Each year 90 million tons are imported to European chicken and pork farms.

Pressure must not only carry on but must also be intensified so that these varieties are banned. On the other hand, multinationals are once more developing new plants that are being manipulated with the help of new techniques such as cysgenisis and mutagenesis; these techniques too are based on patents on life and on the control of intellectual property, all of which are framed according to an agro-industrial model geared for the profit of corporations .

What the Future Holds

Biotechnology relies on the false dangerous principle that men must dominate Nature and oversimplify it. In the countries which have allowed GM seeds to be introduced, the latter have led to an increase of monoculture, an elimination of crop rotation, and shrinking biodiversity.

The price increase of the main cereals and the scandalous speculation it gives rise to, which in turn increases the tendency to soaring prices, must remind us that almost a billion children, women, and men on this planet go hungry. Forty million die each year of malnutrition. This is totally unacceptable. In 25 years time, world agriculture will have to pick up the challenge of feeding two billion more people. Given that global warming and depleting fossil fuel resources are making the viability of the industrial agricultural model very unreliable the international community has no other alternative but to launch a world programme for the development of small-scale farming which uses minimal inputs.

The stability of many regions on this planet will depend on the extent to which this challenge would have been successfully taken up. As the past fifteen years have shown, biotechnology cannot be part of the solution.

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B. Europe

ITALY
The Italian Network of GMO-Free Organizations

*Luca Colombo, Italy **

The issue of GMOs in Italy has not all been negative: GMOs have provided a useful tool through which society can react to the dispossession of its food rights. Italy is a good example of this. The country has witnessed the rise of a widespread awareness, a convergence of social and economic interests and institutions that have stood up together to defend a notion of authentic agriculture and food. The response to transgenic cultivations has been based on four pillars: building consensus through exchange of available information, establishment of a heterogeneous and majority social bloc, capacity for dialogue and exchange with national and territorial institutions, and defense of the territory through the mobilization of local authorities.

The issue of GMOs has in fact given rise to a phenomenon of active resistance in defence of a food culture rooted in farmers' knowledge and in the essences flavours of the surrounding countryside. An attitude that has revolved around a logic that refutes a flawed technology and the totalitarian paradigm which wants to impose it, leading to very clear outcomes: in Italy, not one hectare is cultivated with GMOs, there is a limit otof open field transgenic crops testing, secondary access routes for GMOs (like seed contamination) are kept under check by customs authorities and agricultural institutions. The food industry and organized distribution networks have adopted strict policies to exclude transgenic ingredients from the foods they sell, citizens are well informed, aware and strongly pitted against their presence in both field and plate. To date, GMOs are only present in transgenic soya imports that end up hidden in livestock feed.

According to the European Commission- sponsored Eurobarometer, 76% of Italian citizens say they are concerned about and are against GMOs. Food preferences have been accepted as an individual right and have guided political and economic choice, particularly at the local level, resulting in the defence of existing food, wine, agricultural, environmental, financial and cultural systems. Italy was also one of the first to introduce basic norms on which to launch socially agreed choices over what to eat and how to grow food.

Over the course of 15 years, as a result of transgenic aggression, a large number of organizations with varied affiliations have increasingly found common ground in the fight against GMOS. One such example was the call to uproot fields and compensate corn farmers who had unknowingly sown plots of GM contaminated grain so as to prevent a spread of contamination.
What began as short-term alliances have gradually grown in strength geared towards building a perspective of agri-food systems' development based on quality, territorial, social and environmental sustainability, and GMO-free.

In 2007 Italy held a nation-wide consultation where the GMO issue was raised in the broader context of agri-food development; this was seen as an opportunity to define a new basic

agreement through which Italian society at all levels could shape the future of food, including production and consumption on which individual and collective survival are based. The consultation was sponsored by *GMO Free-ItalyEurope, a* coalition of 32 organizations coming from the conventional and organic agricultural world, artisinal and retail production, environmental and consumer activism, culture and international solidarity and cooperation. Such a coalition would have been unlikely if the threat posed by GM crops hadn't facilitated the dialogue between organizations with different roles, social identity and cultural and political foundations which at times had even been in conflict with one another.

Such a convergence between agricultural organizations (the two largest professional organizations in terms of members and the largest and most representative organic association all joined the Coalition) and environmental and consumer associations, to mention a few of the key stakeholders, would have been inconceivable only 20 years earlier, when these groups were confronting each other over issues such as the use of chemicals in agriculture or quality and price of food. Instead, the testing ground for this alliance came precisely on the organic issue through the mobilization in Europe to defend organic agriculture from the introduction of a GMO tolerance threshold of 0.9%, which followed the provisions for labelling conventional foods. This led to the extraordinary result of the European Parliament's vote which gave its blessing to the technical zero contamination, later voided in the European Council (with Italy voting against).

The resistance against GMOs, recognized as a common threat, thus generated a valuable unifying element, contributing to emphasize the commonality of interests and sensibilities spread across the country and bringing together a wide and varied social fabric that had otherwise been extremely fragmented.

The national consultation was successful in providing civil society with 2 months of debate where citizens could participate directly in a discussion on agri-food issues. The consultation of autumn 2007 saw a proliferation of initiatives in the area with hundreds of meetings, conventions, seminars, exhibitions, cultural and food and wine events spread across big cities and small rural counties, during which citizens had an occasion to get informed, speak up and finally express their preferences and expectations in respect to the agri-food development model the country should establish. Such preferences could be recorded through a voting card similar to that used during referendums on which people were asked their "signed-vote" on questions such as "Do you want food and its quality to be the tenets of a sustainable and innovative development, made up of people and territories, health and quality, founded on biodiversity and GMO free?"
Do you want development to be sustainable and innovative, centred on people and territories, biodiversity, health and quality food and GMO free?

This was basically an attempt to gather the beliefs of people and communities far beyond the GMO issue, envisioning the overall development trajectory of the country, the logics through which political and economic decisions are made, the role of social and political representation, participatory democracy and social participation.

This initiative involved several months of planning, of coalition building, organizational definition and meetings with the institutional and political world, industry, research and media which

continued even during the course of the Consultation: talks were held with the Presidents of the Houses of Parliament, with Government representatives, with majority and opposition parties, with the Heads of regional Councils, with the Directors of major newspapers and television channels.

In this respect, Italy has put in place a democratic experiment: if food has been the benchmark to verify if and how a wide consultation could become an incubator for decisions, this deliberation model proved viable and replicable on equally crucial issues such as choices over energy or social status. In their own peculiar manner, this is what several other countries are broadly experimenting with in the world's North and South through citizen committees, coordination conferences, civic juries, and workshops on "future scenarios" or referendums to grasp and synthesize the diversity of widespread interests. This experience can also be read under another key: the Italian battle over the GMO issue represents one of the most coherent and apparent manifestations of the pursue of food sovereignty inspired by the freedom to choose what to grow and eat, recognizing in this inspirational principle of political and productive action an element of re-appropriation of a population's food destiny.

The Consultation's experience has produced a positive inertia that has been useful to preserve Italy's GMO free status, though it has also suffered some setbacks caused by individualistic interests, battles for leadership and visibility that should be remembered and accounted for. Now, mobilization gathers around a so-called "Anti-transgenic Task Force" which intervenes in occasion of events or circumstances that call for decisive action. An example of such initiatives was offered in 2010 by illegal planting of transgenic corn in Friuli, in the North East of Italy: Italy was faced with an attempt to forcefully introduce cultivation of MON 810 corn on a few hectares of land by some farmers who made it their mission to allow the entry of biotech crops. The challenge was taken up by the anti-transgenic social front which turned it into a national case causing the awakening of agricultural institutions and provoking a boomerang effect: though with great delay, the transgenic fields were seized, the crop put under quarantine, the farmer criminally convicted and subject to fines totalling 25.000 Euros. 52 social organizations in Friuli passed a proposal for a regional law, largely shared and voted for by the regional council in 2011, thus sanctioning the Friuli territory's position of not being open from then on to GMO cultivation.

* ***Luca Colombo****, Coordinator of the Italian Foundation for Research in Organic and Biodynamic Agriculture and president of the GMO Free-Italy/Europe. Since 2001 has led the campaign against GMOs, first with Greenpeace and subsequently in the Foundation for Genetic Rights. www.firab.it/*

B. Europe

SWITZERLAND
If people are asked they say NO to GMOs

*Florianne Koechlin, Blueridge Institute, Switzerland**

November 27, 2005 was a special day for Switzerland: All Swiss persons age 18 and older were asked to vote if they wanted a five years moratorium on commercial releases of GM crops in Switzerland: Yes or No. The initiative[101] was accepted by 55,7%. The main point being: Every single district, all 26 of them, said Yes to the moratorium. The moratorium is now part of the Swiss Constitution.

For the initiative we had to collect 110'000 signatures – which turned out to be quite easy. But still the positive result was a real surprise. The Swiss Government, the national Parliament, all middle and right wing parties as well as main stream science opposed the initiative. Their campaign contained all the known arguments: damage for the research location Switzerland, loss of jobs, economic disadvantages etc.

A historian told us that it was the first time ever in Swiss history that an initiative was won in all 26 districts, against the opposition of Government and Parliament. (There was one other initiative won in all districts: a request that August first, our national day, should be a public holiday – but this initiative was supported by the Government and all parties).

So: When people are asked about whether they want GMOs or not, they say No. The amazing support for the moratorium came from all the 'usual suspects' as well as many supporters of conservative, pro GMO-parties who voted against their own party's doctrine and also from people who normally do not bother to vote. So even in the home-country of Syngenta, Nestlé, Novartis &Co people say No to GM food. Interestingly these companies did not feature in the campaign against the referendum; it was the scientists and politicians who spoke on their behalf.

An important condition for the success of the initiative was the extremely broad coalition in support of it. You might say that a five years moratorium is not much, and some of the more radical NGOs (GreenPeace among them) did not support the initiative in the beginning. But this moderate request made it possible to build up a coalition from right to left. The conservative Swiss farmers union was on the boat, as well as the 'country women Switzerland', all organic farmer associations, all consumer, Third World, environment NGOs and many more. The driving force was the SAG (Schweizerische Arbeitsgruppe Gentechnologie), an umbrella organisation of all GMO-critical NGOs in Switzerland, where I'm on the steering committee. It was the first time that such a broad (and fragile) coalition took shape.

The ban on GM crops – and mainly the nationwide and intensive discussion of the moratorium before the vote – had a domino effect. Although some transgenic maize and soja lines are

[101] The Swiss constitution contains two tools for peoples participation other than elections: With an initiative you can provoke a vote for a new article of the Swiss constitution. You have to collect at least 100'000 signatures in less than 18 months. Most initiatives are declined by the voters. With the referendum you can provoke a vote if you oppose a new law. You have to collect at least 50'000 signatures in less than 6 months. Changes in the Constitution are automatically put up for a vote.

authorized in Switzerland, there is no GM food on offer on the market. And the amount of feed imports has decreased from year to year. Today, according to the statistics of the agriculture department, 99,9% of feed imports are GMOfree. So we're proud to say that Switzerland is GMO-free: no commercial releases, no transgenic food in the shelves, no transgenic feed on the market. And only three small experimental releases, which turned out to be a scientific fiasco[102].

A few years later, in 2009, the 5th conference of GMO-free regions in Europe was hosted in Lucerne, Switzerland. Switzerland, it seemed, offered possibility to more democracy, and a means to establish a moratorium for commercial releases of GMOs. To be clear: I'm not very proud of being Swiss in many aspects, but this legal possibility of the initiative and referendum seems to me to be a valuable model for people participation, for involving people in the democratic process.

Also in 2009, a year before the moratorium ended, there was a national discussion about how to proceed. Government and Parliament decided to prolong the moratorium for another 3 years, till 2013. What happened? Government and Parliament were still (nearly) the same, and still a majority of GMO-supporters. But it had become clear that the moratorium (which does not include experimental releases of GMOs) had in no way had a negative impact. (Also, of course, everybody knew that if they would not agree to a prolongation we would start another initiative).
To cite from the recommendation of the Government to the Parliament:
"The Government's opinion is, that neither in agriculture nor for consumers there is an urgent need for GMOs in food."

" According to consumer opinion there is not only no need for GMO products, but the rejection of them is perceived even as an advantage. What consumers want are high-quality, natural foods which have not been genetically modified."

"In the long run the three year extension of the moratorium has no effect for the economy as a whole. No consequences are to be expected for the job market or for the attractiveness of Switzerland as a location for business."

The moratorium turned out to be a good selling argument too: Swissness includes gentech free food. A competitive advantage on the European and international market for an agriculture which, in small spaced and hilly Switzerland, consists of many small farmers who have difficulties competing against vast monocultures.

Florianne Koechlin, *Freelance biologist, author, Managing Director of the Blueridge Institute Ch. (Münchenstein, BL) that links environmental protection with ethical criteria and economic success.*
Member of ECNH (Federal Ethics Committee on Non-Human Biotechnology), SAG (Swiss Working Group Genetic Engineering: Umbrella organisation of all Swiss NGOs critical of genetic engineering), www.blueridge-institute.ch.

[102] Transgenic mildew resistant wheat plants. Outside the greenhouse the production sank by 50% and they were 40% more susceptible to ergot, a toxic fungus.

B. Europe

POLAND
Poland and GMOs

*Julian Rose and Jadwiga Lopata**

Poland is a large and agriculturally significant Country. It retains a large peasant farming tradition of some 1.4 million small family farms that work mostly on a subsistence level. Then there is a tranche of medium sized traditional farms and an area of large scale monoculturally oriented arable enterprises. Some 2 million farmers comprise the total on farm work force.

There are two broad areas of 'Stop GMO' work undertaken by ICPPC and our affiliated colleagues over the past 10 years. Firstly: emphasis given to working on the governmental level and secondly on the incremental raising of grass roots awareness and direct actions at the regional/local level.

Poland emerged into the 21st century with a reasonably robust legal act to prevent indiscriminate planting of GM seeds/crops on her agricultural land. However, as the 2004 date of Polish entry into the EU approached, the pressure to take an EU based 'liberal view' on GM plantings gathered momentum.
High level pro GM trade missions from the United States Department of Agriculture became increasingly frequent and the US Embassy in Warsaw became the quasi HQ of pro GM lobbying activities, with close ties to the Monsanto corporation. Cargill mounted a similar offensive on the GM animal feed front and used advertising on US television to depict Polish peasant farmers as an outdated, poor but romantic underclass in need of Cargill's generosity in supplying 'cheap' nitrates to make them competitive.

Strenuous ICPPC efforts to alert the government and the farming community to the dangers of joining the EU and its CAP distorted subsidies failed to elicit sufficiently strong backing and in 2004 Poland voted for the 'pot of gold' they had been promised – and joined the European Union.

In order to counteract the intense GM propaganda machine which accompanied Poland's EU entry ICPPC decided to devote 90% of its time and resources to preventing commercial planting of GM crops. The plan we put into effect was to approach the regional authorities of each of Poland's 16 provinces and convince them that GM constituted a direct threat to the traditional quality of their region's food, the biodiversity of the environment and to human health.

The first region we approached was Podkarpacie in South East Poland. Here we were able to gain the support of a regional authority executive who agreed to table a call that the Province should be declared a "GMO Free Zone". This was carried and Podkarpacie became the first self declared GMO Free Zone in Poland in the autumn of 2004. This success spurred us on, and applying the same methodology to Malopolska province soon elicited another positive outcome. The campaign for a GMO Free Poland gathered pace and in a year and a half every province in Poland had declared itself 'GMO Free'.

The declarations did not carry any legal weight, but constituted a powerful symbolic barometer of public sentiment. However, the chairmen of each province wrote to the Polish Minister of Agriculture (Law and Justice party) and demanded that he enact legislation to give validity to the self declared GMO Free status of the regions. Much to our surprise, early in 2006, Prime Minister Kaczynski responded by banning the import and planting of GM seeds and banning GM animal feed with effect from 2008. Poland thus became the first Country in Europe to enact such a ban.

The backlash from the GM corporate cartel was strong. The animal feed ban was quickly identified as likely to cause a significant non GM feed price rise to intensive poultry and pig farms (such as the Polish arm of US pig giant Smithfield) which were already undercutting the market for traditional small scale pig and poultry enterprises.

In the general election of 2007, Kaczynski's government was replaced by the Civic Platform party led by current prime minister Donald Tusk. This signalled a significant turn of events in favour opening Poland up for GM plantings which we were forced to counteract with every possible resource at our disposal – but only the minimum financial backing.

In 2008 Tusk agreed to push back the introduction of a GM animal feed ban to 2013 – in effect killing the initiative. Next the government set its sights on watering down the GM seeds ban by announcing that this was not in line with EU Member State regulations and that Poland would have to pay a non compliance fine to Brussels. A new 'GMO Act' was required, it said, which would allow for 'co-existence' between GM and non GM plantings.

ICPPC's response was to organise a number of high level anti GMO conferences and to go on a national wide lecture tour highlighting the dangers of allowing genetically modified organisms into the fields and food chain. Arpad Pusztai, Jeffrey Smith and Percy Smeicher were brought over to Poland to make the case for maintaining a GMO Free agenda. Later, Irena Ermakova of the Russian Academy of Science also gave a public lecture. On tour, Jadwiga Lopata and Julian Rose (ICPPC directors) were often the only anti GM speakers lined-up against academics from GM supportive university departments giving their pro GMO power point presentations direct from the Monsanto hand book.

The Polish national media, which had in the early days (circa 2001) been reasonably open, became a closed shop for anti GMO activists, reflecting the hard line corporate and government stance adopted during the Civic Platform reign. This forced us to be very inventive in our activist approaches. Street theatre, anti GM happenings and a 'red bus' educational tour were instigated at the regional level with demonstrations and mass letter writing at the national government level.
Polish citizens were thus encouraged to become aware of the GMO threat and take-up active resistance. Something that is just beginning to take affect at this time.

The net effect of these actions has been to 'hold the line' and to block the passage of any new pro GM legislation. Most recently, the proposed liberalised 'Seeds Act' was prevented from becoming law only when Polish President Komorowski – under significant public pressure - vetoed it at the last moment, declaring that he had 'nothing against GMO' but found the proposed Act "rubbish".

As Poland approaches a new general election in October 2011 the momentum is beginning to move our way. The recent defeat of the pro GM lobby was widely reported and has led to further calls for the retention of Poland's "GMO Free" status. There are a number of initiatives moving forward to get a total ban, including a legal challenge against the current government position. However, Poland's Presidency of the EU is seen as a helpful tool for the re-election of the present government, and it will remain a major challenge to get a properly ratified and policed ban in place.

Wikki Leaks recently released a number of documents outlining the pressures the US was exerting on Poland to accept GMO over the past 10 years. There is no doubt that the Country was seen as a prime target – a sort of Eastern European oasis for GM crops and a bridge head for advances beyond. The collective effort of a small group of committed citizens (and outsiders) has, up until now, been able to block this advance. Our next target is for the proper enforcement of a national ban, thus joining Poland to the nine other EU Countries that have banned MON 810 and Amflora. The European Commission would be hard pressed to maintain its stance of acting as the EU processor of WTO and Codex regulations if Poland also swung behind a ban.

However, the decentralisation of Brussels GMO decision making powers to the Member States currently being proposed by the European Parliament, looks dangerously like a Trojan Horse for WTO and corporate GM cartels to force their way into all but the strongest GM resisting Countries, while Brussels stands aside.

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Jadwiga Lopata *founder and Director of the ICPPC and President of ECEAT-Poland, the European Centre for Ecological Agriculture and Tourism-Poland, member of ASHOKA-Innovators for the Public and leading activist in Poland's GMO free movement. She is the owner of a small organic farm. In 2002, ICPPC was awarded the Goldman Prize - Ecological Nobel - for its international campaign to protect the Polish, small, family farms. www.icppc.pl www.gmo.icppc.pl www.eko-cel.pl*

B. Europe

RUSSIA
The struggle and state of GMOs in Russia

*Dr. Alexander Baranoff, Genetic Resources Conservation Department of World Peace Culture Fund**

Legislation

International level. The Russian Federation has actively participated at the international level in elaboration of the Rio Declaration 1992 (which then came into force 29 December 1993), of the Convention on biodiversity (CBD) which had been ratified by the RF Parliament 17 February 1995 (Federal Law #16), and of the Protocol on biodiversity (Cartagena Protocol). The latter is still not signed and ratified by Russia.

National level. There are several legislative acts in Russia which regulate turnover and usage of GMOs in areas of scientific researches, safety testing and food labeling.
On 5 July 1996 the first all-Russian law #86 "On state regulation in the area of genetic engineering" was adopted which served as the basis for further regulation of genetic engineering. It is to be noted that the precautionary principle of the Rio Declaration (No.15) was not reflected in this law.

No law prohibits the breeding of GMOs. Such breeding could be permitted after environmental and biological safety tests are carried out by scientific institutions and reviewed by the Commission of State of Environmental Expertise, the final authorizing body within the Ministry of Natural Resources. However, no permit for the breeding of any genetically modifed cultural plant has yet been issued, thus breeding of GMOs in Russia is prohibited.

Despite this, Russia actively imports GM raw materials and feed, a trade-off for GMO lobbyists, many of whom are representatives of USA government and transnational biotech corporations. This was clearly illustrated by Russia's accession to the WTO; as a result of negotiations between the USA and the Russian Federation, the Parties signed 5 special letters, one of them being fully devoted to biotechnology issues. It provides for USA control over the creation and usage of GMOs in Russia, obligatory registration of GM cultures generated in the USA, and the cancelling of GM food labeling. There is wide skepticism about Russia's accession to the WTO, expected to take effect this year 2011, fearing it will have negative impact on its agriculture, including a sharp decrease in food safety and a lessening of farmers' freedom.

US industry lobbying activities in the Russian Federation (RF) and Monsanto's influence in the government's authorizing procedures can be clearly illustrated when they attempted to obtain the Russian Federation's approval of Monsanto Europe transgenic potatoes Russet Burbank Newlive and Superior Newlive. In February 2002 the Expert Commission (EC) on GMOs of the Ministry of Natural Resources found that the health safety of these GM potatoes had not been proved, and recommended not to include them in the State Registry. It also did not approve of other transgenic types. In May the Commission was closed as having 'fulfilled it functions.' Coincidentally that

summer, the Ministry began forming a new Commission at the same time that Monsanto Europe C.A. again submitted a request for the same types of GM potatoes with the same documentation. The composition of the new Expert Commission was approved in the fall and Monsanto's application was to be considered at its first session. Oddly though, just before the session began, Monsanto recalled all its documentation seemingly after it was informed of the composition of the Commission. The Monsanto Europe C.A. in Moscow is still operating though its GMO supervising department has been closed.

In cooperation with the Russian GM lobby - the Bioengineering Centre of the Russian Academy of Sciences; Institute of Nutrition of the Russian Academy of Medical Sciences, Federal Agency of consumers rights protection, Grain Union of Russia, Black Sea Biotech Association and others – Monsanto continues to push for a change in Russian legislation to allow the breeding of GMOs through the state's new technical regulations on biosafety. These organizations participate in competitions and win tenders to draft such regulations. Additionally, former Monsanto functionaries and those who have collaborated with the Commission are invited to these meetings, and some are now working for the Grain Union of Russia after the GMO Department was closed.

Some GMO proponents openly assert that GMO crops exist de facto and use this to call for the legitimization of these crops. One of the main GMO lobbyists, the Grain Union (President A. Zlachevskiy), is one such proponent. It is likely that such illegal crops exist, but probably not to the extent they say (about 10%). This would mean that society faces the open and intentional violation of acting legislation which should be prosecuted. But there are no sanctions in RF legislation for such violations. And the Grain Union knowing about such violations of Law, should not use this fact to argue for the abandonment of GMO breeding prohibition. By not reporting such facts to the controlling bodies the Grain Union becomes intended co-violator of Law. It is essential that the illegal dissemination of GMOs must be controlled by legislation .

Biosafety testing of GMOs.

The scientific community in Russia is split between the proponents and opponents of a rapid introduction of GMOs and their commercial usage.

Though no transgenic cultures in Russia have been approved for cultivation, their use is permitted in food and animal feeds. There are 16 GM plants and 5 microorganisms officially allowed. The plants include: soya, corn, sugarbeet, potato and rice.- Not one has undergone comprehensive long-term testing.

There are 6 scientific institutions that have been accredited with the testing of the environmental and biological safety of GMOs. This research is financed by companies who wish to grow their products in Russian fields. Among those organizations accredited are the Centre of Bioengineering, the Institute of Biological Plants Protection and the Institute of Nutrition, all active proponents for the introduction of GMOs into Russia. They are simultaneously the designers of GMOs, as well as those who test the safety of GMOs and their conclusions are always positive. The conflict of interest is obvious. Previously these institutions actively cooperated with biotech companies (including Monsanto), receiving scientific grants and financial support from these corporations to supposedly 'test' the safety of GMOs.

The Institute of Nutrition is the lead organization for testing the safety of food, including for GM components. Its positive conclusions on the full biosafety of Monsanto GM-beet and GM-potatoes were declared faulty by the State Environmental Expert Commission on GMOs as these types of plants and other 16 GM lines had been tested with violations. The research had been carried out only on one – and in one case two generations, but not on five generations, as required by the legislative act of April 24, 2000, on the "method of medical-biological evaluation of food produced from GM sources."

It is still unclear why research on the GMO impact on mammals reproductive function are considered as special and thus not obligatory by the main Federal controlling agency in the area of food safety: the Rospotrebnadzor. Numerous scientific experiments of foreign and Russian scientists demonstrate that the mammalian reproduction system is very vulnerable to GMOs.

Independent research by Russian scientists

Besides specially-ordered scientific research on GMO biosafety financed by firms from accredited institutions, there have been three independent areas of investigation in the sensitivity of mammals to GMOs in Russia: by Dr. Irina Ermakova on rats (the Institute of High Neural Activity and Neurophysiology of Russian Academy of Sciences- RAS, Moscow); Dr. Alexey Surov and Dr. Alexander Baranov with colleagues on hamsters (the Institute of Environmental and Evolution Problems RAS and the Institute of Developmental Biology RAS, Moscow); Maria Konovalova on mice (the Saratov Agrarian University).

Results of all three tests suggested sharp biological and behavioral changes in the mammals once their feed was amended with GM soya or GM corn. Animals became more aggressive, lost maternity instinct, mortality among newborns in first generation increased, the quantity of offspring diminished, and, most importantly, already in the second generation animals, became sterile.

As the magazine "Scientific American" published Fall 2009 *("Do Seed companies control GM crop research? August 13, 2009. 37*)) there is an agreement between leading transnational biotech companies to not allow farmers to transfer seeds to third persons and to not acknowledge tests results if tests had been made on their GM plants without their agreement.

Wide scientific discussion on GMOs in periodical, scientific, and popular magazines in the USA led to a meeting in the summer of 2009 between the Presidents of the US and Russian Academies of Sciences: Dr. Ralf Siserown and Dr. Yuriy Osipov respectively.

Out of this meeting came the agreement "to create a joint inter-academic Working Group to provide analysis of the results of GMO tests and usage with the target to prepare a coherent Report" to Presidents of both states. The US proposed 3 structural versions of the Russian-American report structure:

I. The Report may consist of three parts: the state of GMOs in the USA and in Russia; and the overall status of GMOs in the world. Each party independently prepares its part and provides for the procedure the whole Report text.
II. Preparation of an extensively detailed report on GMOs with scientific proof and examples from around the world and Russia.

III. A short joint official statement on the issues concerning current GMO scientific research .

GMO products in Russia

Assessments of GM products in the Russian market made by governmental and non-governmental organizations greatly differ: according to Rospotrebnadzor the amount of GM products in the Russian market is less than 1 percent. However, NGO "Greenpeace-Russia" states that there is a minimum of 4 percent. And according to assessments by the NGO: "All-National Association of Genetic Safety (OAGB)," 17 – 20 percent of Russian products contain GM ingredients, and in imported products they contain 30 to 40 percent. Currently - thanks to Russian NGOs and consumer rights associations - the number of GM products in shops has sharply decreased in comparison with 2004.

It is also necessary to mention the usage of GMOs in baby formula, which was allowed in an amendment passed in 2009, as a result of the active lobbying by the Institute of Nutrition, the Russian Academy of Medical Sciences, and the State Duma (RF Parliament). Examinations of this sector of the market by NGOs had shown that most big producers of baby formula ignore labeling regulations. It was especially noted at the beginning of 2004, when EC introduced the obligatory labeling of GMOs, and all non-labeled products had been immediately exported to 3rd world countries as well as Russia. The total examination by OAGB at that time had shown that one import of baby formula consisted of 50 to 100 percent GM ingredients, though the product itself had no relevant labeling. One such brand was Nestle. After this study was published, Nestle filed a defamation law suit against the NGO "OAGB." After long term court hearings the court ruled against Nestle - a rare example of a Russian NGO victory against a transnational corporation.

Labelling and public awareness

There are currently legal norms established that make labeling of GM ingredients obligatory if they are produced with use of transgenic components

In a previous Decree by the Chief Sanitary Medic in 2001, it was obligatory to label products if 5 percent or more of the ingredients were GM. After numerous NGOs and scientists in Russia protested, there was an amendment adopted to the Federal Law: "On consumers rights protection" (Art.10) which required producers to label their products that contain any quantity of GM ingredients. This was the regulation until November 2006, when a new bill establishing a threshold of 9 percent of GM ingredients was introduced. According to proponents of this bill (some producers, the Consumers Association, Greenpeace-Russia) the harmonization between RF and EC legislation had been achieved.

However, other Russian scientists and NGOs believe that such a threshold is meaningless, that there is no safe level of GMO ingredients, and either there should be total prohibition for GMO usage introduced, or total obligatory labeling for any GM quantity.

Anti-GMO public movement and GMO free Zones

The Russian society does not approve of GMOs. According to polls, 86 percent of Russian citizens are against GMO breeding, 73 percent are against using GMOs in food, and 98 percent are against using GMOs in baby formula.

Many Russian environmental NGOs are leading active work on the issues of GMOs.
At the All-Russian Conference "Green Movement in Russia and Environmental Challenges," the united position of all RF environmental NGOs on these issues was elaborated and adopted. The main demands are the following:

1) Temporarily stop the usage of the already approved 16 GMOs until we have the results of new governmental and independent research, and also declare a moratorium on the registration of new GMOs;
2) Adopt relevant legislation to exclude the possibility of procurement of GM products for children's nutrition in schools, children's gardens, and hospitals.
3)
The hesitation of authorities to allow an in-depth discussion on GMOs activated the protest movement in Russia. The following cities and regions were among the first: Moscow, Nigniy Novgorod Oblast, Kostromskaya Oblast, Murmanskaya Oblast, Belgorodskaya Oblast, Kurganskaya Oblast, Krasnodarskiy and Krasnoyarskiy Krais. The very illustrative examples of such protests are the Belgorodskaya Oblast Decree of June 24, 2004 "On measures for full prohibition of GM resources in Belgorodskaya Oblast" and the Moscow City Duma (Parliament) Decision "On prohibition for budget procurements of GM products and raw materials for social services in Moscow." In Russia, as in Europe during the last decade, GM Free zones are steadily increasing.

GMO proponents argue that during 20 years of GMO usage in the world there is no proof of their negative impacts on human health. Certainly, there are none, as there is still no state which has managed to carry out such comprehensive research. And what should be the basis of proof for revealing human health damage if it is still uncertain what we have to look for, where to look, according to what criteria to evaluate and what could be the possible affecting mechanism – direct or indirect. Medical examiners ask : how could any correlation be revealed between health damage and eaten food if food is not labeled for GMOs. And what should the examiner look for: a new toxin derived from a GM-plant itself, or a toxin produced as the result of genetic maker fusion in genom E.coli , etc...

One of the possible ways to prohibit GM plants from becoming resistant to pesticides is introducing via the International Commission on Pesticides a taboo on the usage of glyphosate natrium ("Round-Up-Ready") in agriculture all around the world. Such request from several EC countries has been already submitted.

According to the World Health Organizations (WHO) data, today there are less undernourished people in the world than people suffering from overnutrition: the balance is 1:2,7.
Mortality and morbidity among overfed groups is much higher then among the hungry.
According to FAO data there is a substantial over production of food in economically developed countries. The result is abnormal overnutrition, and food waste going to fill the landfills.

Solving the hunger problem is linked to the social organization in developing countries where 98 percent of the world"s hungry people live, and with a redistribution of food from developed countries to third world countries, but not with the use of GMOs around the world.

* ***Alexander Baranoff,*** *Head of the Genetic Resources Conservation Department of World Peace Culture Fund and leading scientific researcher at the Laboratory of postnatal ontogenesis, N.K. Koltzov's Institute of Developmental Biology Russian Academy of Sciences; former President of the National Association of Genetic Safety. www.peace-culture.com*

B. Europe

UKRAINE
The State of GMOs in Ukraine

Alexey Sytnik, All-Ukrainian Environmental League *

The Ukrainian biosafety was launched in 1999 with the first resolution of the Cabinet of Ministers. Even the ratification by Ukraine of the UN Cartagena Protocol of Biosafety in 2002 did not result in the well-developed biotechnology regulatory system.
The current Ukrainian legislation with regard to GMOs is based on the main law "On the State Biosafety System for Developing, Testing, Transportation and Usage of Genetically Modified Organisms (further referred to as the Law on Biosafety) adopted on the 30th of May, 2007. It should be mentioned that the Law requires the relevant secondary legislation for its proper execution.

According to the Article 5 of the Law, following activities fall within its scope:

- genetic engineering activities in the closed environment
- genetic engineering activities in the open environment
- state registration of GMOs and products produced using GMOs
- putting into circulation of GMOs and GMO products
- export, import and transit of GMOs
-

No GMO has been approved/registered in Ukraine so far, therefore the cultivation as well as import of GMOs into Ukraine is illegal. The Cabinet of Minister of Ukraine has not yet approved any procedure for the import of GMOs.

Among the weaknesses of the above Law is that it does not introduce the single control agency that would take on the responsibility for ensuring the safe development, testing, transportation and usage of GMOs. Instead of that, regulatory and control responsibilities are divided amongst five central bodies: the Cabinet of Ministers, Ministry of Education and Science, Ministry of Environment and Natural resources, Ministry of Health Care and Ministry of Agricultural Policy.

On the 18th of February, 2009 the Cabinet of Minister adopted the Resolution # 114 "On the procedure for the state registration of genetically modified organisms – sources of food products as well as food products, cosmetics and medicines that contain GMOs or are produced using GMOs.

It is the Ministry of Health Care that is responsible for the state registration of the above products and for the maintenance of the registry. The resolution became effective of the 1st of June 2009, so from that moment it has become possible to register the domestically produced GMOs in Ukraine. Other registration procedures under the Law on Biosafety are still to be approved by the Cabinets of Ministers (for GMOs for feed use, for feed additives and veterinary preparation, for plant protection agents produced using the GMOs, for GMO-based crop variety and GMO- based animal breed.

It should be as well noted that there is already a registration procedure in place in Ukraine with regard to GM plants. Once registered, they can be cultivated in Ukraine. That procedure was introduced by the Cabinet of Ministers "On Provisional Order for Importation, sate testing Registration and usage of Transgenetic Plants" in 1998, long before the entry into force of the Law of Biosafety. The registration process is very lengthy. In total, applications for 5 crops have been submitted so far for Bt potato of Monsanto (three varieties), Bt maize of Syngenta, glyphosinate-tolerant sugar beet of Syngenta and Monsanto, rapeseed of Bayer and Roundup Ready maize of Monsanto. They underwent field trials but none of them got final approval.

It should be admitted that the Ukrainian agriculture is not GMO free. GMOs have entered the food chain supply mainly through the contaminated import consignments.

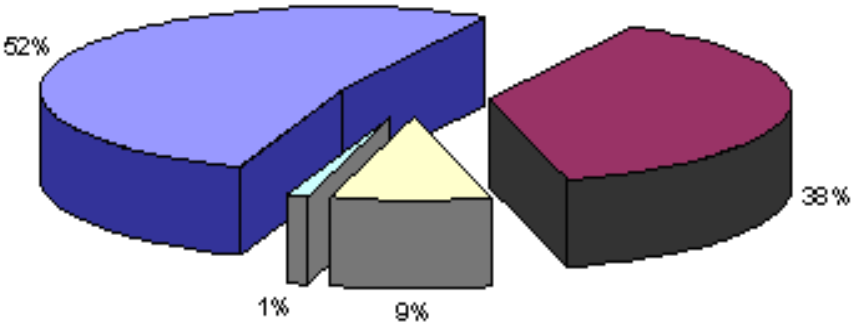
The Law on Biosafety does not regulate the issue of GMO labeling. Mandatory Labeling of GMO is required by the Law "On the Consumer Rights Protection". On the 13th of May the Cabinet of Ministers issued the Resolution "On approval of the Order for Labeling of the food which contains the GMOs or has been produced with their use and is being put into use". According to this resolution which comes into force on the 1st of July, 2009 the food products with GMO content of more than 0,1 % are subject to mandatory labeling.

At present Ukraine has a limited number of the laboratories where GMOs can be identified in food and other products that contain or may contain GMOs It is crucial for Ukraine to set up more independent test centers engaged in estimation of GMO concentration.

The public should be involved in the decision making process regarding the intended GMO release. The consultations should be laid down in order to give the public and the interested groups/organizations the opportunity to voice their opinion.

As per the public opinion poll organized by the Ukrainian Analytical Agency APK-Inform in March, 2009 - 91 % of the farmers answered the had not sown the GM seeds, 52 % replied they did not sow the GM seeds because it was prohibited by the Ukrianian law, 38% underlined that would not sow the GM seeds even if it is leagal against 1 % who confirmed they would if it were legal, only 9% confirmed they had sown the GM seeds (mainly soybeans).

Public opinion poll in Ukraine



- did not sow the GM seeds because it is illegal
- Will not sow the GM seeds even when it is legal
- had sown the GM seeds
- will sow if legalized

* ***Sytnik Alex,*** *PhD, Associate Professor of Chair Ecologycal Biotechnology, National Technical University of Ukraine "KPI" (http://kpi.ua/). Expert on Biosafety at the All-Ukrainian Environmental League the protection of the environment, forming a new environmental mentality, and improving environmental education and culture of citizens. (http://www.ecoleague.net/).*

B. Europe

NORWAY
Voice of the next generation

Protect or Plunder
*Andrew McMillion, Norway**

Each generation has its defining struggles.
Our grandparents' generation fought against Fascism and Nazism in the West, and then Colonialism in the East and South.
Our parents fought the fight for Civil Rights and against war.
I believe our generation is facing the biggest battle mankind, and perhaps even life itself, has seen:
Global warming and massive reduction of the planet's biodiversity.

I believe my generation´s mission is to change the business molds that have created carbon fuel dependency and to reverse the carbon buildup in the environment, which is pressuring the extinction of most of the biodiversity in the land and sea.

There are many ways in which this battle has to be fought. The struggle against GMOs is one aspect of this greater struggle.
One important part is in resisting the growth of companies like Monsanto, that represent the fore-front of the culture of Narcissism. Their business model is based on narrow-minded short-term profit, which has its roots in the illusion of constant growth and expansionism, is destroying the earth's biodiversity with no respect for the genetic inheritance that nature and all of us carry, and with no concern for the environment or future generations.

Monsanto has been one of the top ten largest chemical companies in the US since the 1940´s, producing herbicides, DDT, Agent Orange and PCBs. Of these products, DDT was banned by Congress in 1972 after extensive lobbying by environmentalists. Agent Orange is a defoliant which the US military sprayed 77 million litres of in South Vietnam during the war. According to Vietnamese Ministry of Foreign Affairs, 4.8 million Vietnamese people were exposed to Agent Orange, resulting in 400,000 deaths and disabilities, and 500,000 children born with birth defects. In January 2006, the South Korean Appeals Court ordered Monsanto to pay $62 million in compensation to about 6,800 people. South Koreans were the largest foreign contingent of US allies in Vietnam, contributing some 320,000 troops. The Vietnamese themselves are yet to see any compensation.

Monsanto´s PCB record is no better, the company buried PCBs (which are organic pollutants which are highly detrimental to the environment and to humans) in the ground in Anniston Alabama in 1969, which in the long term destroyed the community. Monsanto settled a class action lawsuit, by paying 700 million $ in 2003. In Norway, Kommunal Landspensjonskasse divested in Monsanto in 2007 due to the

fact that Monsanto dumped thousands of tons of waste containing PCBs in a quarry near Groesfaen, Wales.

Monsanto scientists became the first to genetically modify a plant cell in 1982. Since then GMOs have been an ever increasing part of their business, moving them from a chemicals company to a biotech company. Monsanto patented a number of GMO plants that are resistant to its main herbicide product Roundup, starting with Soya and moving on to Maize, Cotton and Canola.

Although Monsanto claims Roundup is safe for humans, a 2008 scientific study has shown that Roundup formulations and metabolic products cause the death of human embryonic, placental, and umbilical cells, even at low concentrations.

The effects of Roundup on the Environment are equally disturbing. Roundup's main ingredient is classed by the European Union as "dangerous for the environment" and "toxic for aquatic organisms". In January 2007, Monsanto was convicted of false advertising for roundup in France.

The patenting of huge numbers of plants is in effect the appropriation – or biopiracy as Dr. Vandana Shiva points out, of the Earth's natural resources.

Is the science behind GMOs safe? I have no idea as I am not a scientist. What I do know is that I cannot trust Monsanto or companies that make huge profits off of GMOs to be the ones to tell me it is safe. And it is the scientists working for agrochemical Multinationals who are asserting that GMOs are safe.

There are a growing number of independent scientists who have raised concerns as a result of their research on GMOs, including scientists who have worked for Monsanto and scientists who were once pro GMOs. The Precautionary approach to science is the Nordic tradition and it should remain so. There is reason to be concerned - more science is needed, more independent science.

In Norway, the Council on Ethics presented to the Finance Department a "Recommendation of 2006, on exclusion of Monsanto Co" from the Pension Fund. It focused on the link between Monsanto and child labour in India showing that "In the remaining operations linked to the company, there are more than 20,000 children working under totally unacceptable conditions".

We have the choice to stand back and watch as Monsanto rapidly expands their stated aim of owning and manipulating Planet Earth's food chain or we can start fighting this battle to preserve nature's freedom and keep the biodiversity we have inherited from generations that have struggled to keep it for us today. Getting Monsanto out of Norway's Pension Fund is one step on the road in fighting this battle. Let us keep Norway ethical for our children's sake, and not sell our ethics to the highest bidder.

Andrew McMillion *started the youth-led campaign for the Norwegian government to disinvest from Monsanto. American/Norwegian father, business executive and committed Green activist, now living in Norway.*

C. AFRICA
The State of Genetically Modified Crops in Africa

*By Anne Maina, Teresa Anderson and Elfrieda Pschorn-Strauss **

GMO policy and debate inAfrica.

The vast majority of Africa's farmers save their seed. They rely on seed diversity developed over generations for many different uses in nutrition, taste, medicine and culture, and to ensure that they can grow in a variety of climate, soil, and pest conditions. By saving their seed, farmers can select the most appropriate varieties, and ensure that they can plant at the start of every season.

Africa's food security is thus reliant on farmers' right to save seed, and the crop diversity generated from this. Patented genetically modified (GM) crops thus pose a threat to Africa's food security.
Africa remains largely free of GM commercialization; however, certain countries have adopted it and there are increasing field tests of GM crops throughout Africa. South Africa, Burkina Faso and, to a lesser degree, Egypt have commercialized several GM crops, and more African countries are on a path towards introducing genetically modified organisms (GMO) technology , with some countries initiating GM crop trials and a few even passing biosafety laws which may soon lead to the commercial introduction of GMOs. Unfortunately, rather than seeing biosafety laws as tools for biodiversity defense, governments are buying the lie that these laws are made to open the doors for the introduction of GM crops.
In recent years the biotechnology industry has pushed the claim that GMOs are needed to solve hunger in Africa. The hype has focused on the (distant and elusive) future promise of drought-tolerant and nutritionally fortified GM crops. However, the crops closest to commercialization are still the conventional Bt and Roundup Ready (RR) varieties. These varieties are neither drought tolerant nor nutritionally fortified. As in other countries, the industry strategy has been to enter the market with GM cotton, a non-food crop, and in this way open the door for staple food crops such as maize.

In 2003, the African Union recognized the unique threat GM crops posed to Africa's food security and farmers' seed diversity. As a result, the African Model Law (AML) on Biosafety was developed. African states were invited to base their national Biosafety laws on the AML. A unique initiative, the AML advocates the use of the Precautionary Principle, giving states the right to reject GM crops if there is a risk to human health, or negative environmental, or socio-economic impacts. Furthermore, if local seed varieties are contaminated with GM genes through cross-pollination or seed mixing, the AML demands liability from the corporations responsible to compensate farmers for their loss. Unfortunately, the AML remains a voluntary guideline, and is not used by governments as effectively or extensively as it should be.

GM crops introduced and cultivated in Africa

South Africa first approved GM technology in 1997, and since then has commercially grown Bt maize, Bt cotton, Roundup-Ready soya and now crops with stacked genes which combine herbicide resistance with Bt toxin traits. Burkina Faso officially approved Bt cotton in 2004 with farmers starting to plant commercially in 2008. Egypt approved commercialization of Bt cotton in 2008 and recently approved Bt maize.

Field trials have been done on many more crops, with South Africa taking the lead with controversial field trials on potatoes, cassava, sugar cane, and grapes. Nigeria has done field trials on "nutritionally enhanced" cassava and cowpea; Egypt on maize, cotton, wheat, potato, cucumber, melon and tomatoes; Kenya on maize, cotton, cassava, and sweet potato; and Uganda on banana, maize, cotton, cassava, and sweet potato. Traits tested during field trials included herbicide tolerance (cotton, maize, soya); insect resistance (cotton, maize, cowpea, sweet potato); viral resistance (cassava, sweet potato, tomato; melon, cucumber); fungal resistance (banana); salt tolerance (cotton); drought tolerance (wheat, maize); starch and sugar enhancement (cassava, sugar cane); and nutrient enhancement (cassava, sweet potato).
GM field trials for the Water Efficient Maize for Africa (WEMA), have already begun in South Africa, and are scheduled to start soon in Uganda, Kenya, Tanzania, and Mozambique. Uganda is currently considering GM banana trials to combat bacterial disease common to banana crops. Kenyan trials of Insect Resistant Maize for Africa (IRMA), i.e., Bt maize, are currently taking place, while a push for commercial approval and distribution to farmers is expected to take place in the near future. Kenya also undertook trials of GM sweet potato some years ago (see below). In South Africa, there have been trials for GM potato, sugar cane and grapevines and trial applications are pending for GM crops intended for biofuel production.

The influence of corporations, aid organizations, and other actors in the GMO debate
The Kenya Agricultural Research Institute (KARI) receives funding from USAID, Monsanto, and Syngenta, which has strongly influenced the direction of its agricultural research towards biotechnology. Syngenta Foundation provided funds to KARI's 2005 field trials on Bt maize. Monsanto and USAID collaborated with KARI in 2004 to trial a GM sweet potato that was supposed to be virus-resistant. However, the trials showed that the GM variety was less resistant to the virus than the conventional variety.

The President of Tanzania recently announced a new initiative in collaboration with Monsanto, USAID, Syngenta and other players called "A New Vision for Agriculture," ostensibly to increase food production in Tanzania. This initiative will promote modern biotechnology approaches.
USAID has also been working closely with African governments to influence and develop their biosafety regimes with the clear aim of permitting GM seeds and crops. An example of such influence is reflected in the 2009 Kenya Biosafety Law, which requires no liability or compensation for the contamination of local seed by GM crops.

In Burkina Faso, Monsanto and Syngenta Foundation funded INERA, the Institute de l'Environnement, et de Recherches Agricoles (Institute for Environment and Agricultural Research) to carry out trials of Bt cotton.

In 2002, an international controversy over the import of GM maize as food aid took place in Southern Africa. Countries such as Zambia and Namibia were wary of GM contamination of local maize varieties, and asked the World Food Programme (WFP) to provide GM-Free alternatives. The WFP refused, as it was strongly influenced by USAID, the provider of the GM maize. Zambia did not allow the GM food aid to enter the country, and instead sought funds to purchase non-GM maize from within Africa. Namibia accepted the GM maize, but only on condition that it was milled before distribution to prevent the risk of contamination.

Due to very low investment in science and research by African governments, researchers are dependent on industry funding, and in many cases this causes them to advocate for GM crops, often in spite of their own concerns and doubts about its safety and relevance.
A number of organizations acting as a front for industry have taken a proactive "training and awareness raising" role to promote GM and facilitate its entry into Africa. Organisations such as Africabio, the African Agricultural Technology Foundation (AATF) African Biotechnology Stakeholders' Forum (ABSF), Africa Harvest Foundation International (AHBFI), the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), and Open Forum on Agricultural Biotechnology in Africa (OFAB). These groups organise training, study trips, roundtable talks, conferences, etc.., as well as actively lobby for biotechnology in African agriculture.

The impact of GMOs on the environment, human health, and well-being of African farmers and indigenous peoples
In Burkina Faso, approximately 3,000 organic cotton farmers have found their cotton contaminated with GM genes, which has affected their organic certification status, and their ability to sell to premium markets. Bt cotton plants have also suffered serious pest attacks. Additionally, farmers were incorrectly told that the GM crops would not need fertilizers, so their crops have suffered. Consumers in neighbouring countries are reportedly reluctant to buy Burkina's mangoes, due to an (incorrect) fear that these are also genetically modified.

In 2010, a shipment of 240,000 tonnes of maize was shipped from South Africa to Kenya. It was found to have high levels of GM contamination. The Kenya Biodiversity Coalition (KBioC) led a campaign to raise the issue with numerous Kenyan authoritative bodies, and gained significant media attention. As a result, the shipment was blocked at Mombasa harbour, and not permitted to unload or be distributed in Kenya. The resulting furor and lack of clarity in Kenya's legislation led to a shake-up of the Kenyan biosafety authorities, and KBioC members continue to engage with government in the development of standards and guidelines on threshold levels and seed regulations among others. While certain elements of the government are looking to press ahead with both with GM food imports, as well as commercialisation of GM seed, the Kenya Biodiversity Coalition is still fighting a fierce campaign which has blocked approval so far.

While it looked like a done deal at one point, KBioC persisted, and now almost every other week, a new high-profile voice in government comes out and speaks against GM crops and food.

In South Africa, a look beneath the surface of Monsanto's "successful" small-scale Bt cotton farming community in the Makhatini Flats, South Africa, reveal an entirely different story than what the official publicity told. In the first year of growing Bt cotton, farmers were given high levels of support and infrastructure, far beyond the norm for the majority of African farmers. Credit, access to markets, irrigation, and extension services were all provided as part of the scheme. This meant that in the first year, yields, and income were above average. But after generating positive publicity, the infrastructure package was discontinued, and farmers were left to take on the high costs of GM seed but without the additional infrastructure support, leading to lower yields and incomes. A study by Biowatch revealed that after five years, a majority of farmers were now in debt from growing Bt

cotton, and the number of farmers still growing the GM crop had reduced by 80 percent.
In 2009, South African farmers growing Monsanto's GM maize suffered millions of dollars of lost income when 80,000 hectares of the crop failed to produce any seed, in spite of the plants appearing externally healthy. Most of the farmers growing GM crops in South Africa are wealthy large-scale (mostly white) farmers, and Monsanto immediately offered compensation. While Monsanto claimed that the problem had been due to "underfertilisation practices in the laboratory," many doubt this claim, and suggest that the case points to the risky uncertainties that can result from genetic modification.

The legal challenges and their outcome

Biowatch (an organization in South Africa dedicated to protecting Africa's biodiversity from being pirated by corporations) faced a heroic but challenging legal battle with Monsanto over the right of access to information. In 2001, Biowatch's attempts to get biosafety and location information from the National Department of Agriculture (NDA) on several GM crops were refused, leading to Biowatch sending a legal letter outlining NDA's obligation. This dispute led to legal action. Monsanto, Pioneer and Delta Pine joined the NDA in court, claiming that the data was confidential business information, and not for the public domain.

The judge ruled that Biowatch had acted in the public interest, and that eight of the 11 counts of requested information should indeed have been in the public domain. Perversely, however, he ruled that Biowatch had framed their question so broadly that Monsanto had been obliged to come to court, and that Biowatch was liable to pay Monsanto's court costs. Biowatch decided to challenge this ruling, not only because of the impact on the organization, but because the ruling to award costs against a public interest organization, would have had a 'chilling effect' on public interest cases in the future. Biowatch's challenge failed in the High Court and Supreme Court.

Finally, Biowatch went to the Constitutional Court, newly created to hear matters of constitutional significance. Monsanto claimed they simply wanted "the healing balm of costs." In 2009, the Constitutional Court judges unanimously ruled that Biowatch would not have to pay Monsanto, and that the state should pay Biowatch's legal costs.

While the final outcome was a massive victory for Biowatch and GM campaigners in South Africa, the drawn-out case and threat of bankruptcy did take its toll. South African GM campaigners have also consistently challenged the approval of field trials and commercial releases of GM crops by objecting and appealing to these decisions and using the Access to Information Act to insist on higher levels of transparency.

Civil society in the country of Benin in West Africa managed to obtain a five-year moratorium on GM crops and this moratorium was recently renewed.

Intellectual Property Rights and patent issues related to the introduction of GMOs

When Monsanto first attempted to import Bt cotton to Burkina Faso, the crop trials proved to be a failure. To improve the crop's chances in the Burkina climate and soils, Monsanto then used a successful local cotton variety and engineered the Bt gene into that. When the government approved GM commercialization, and encouraged the uptake of Bt cotton by farmers, they

expected to receive royalties from Monsanto for the use of the local variety in their crop. Monsanto has so far refused to share any royalties.

This is symptomatic of the way that Africa's genetic biodiversity is being eroded and patented, and then sold back to the African people with license fees. This practice of claiming proprietary ownership over what is not the industry's to take is often called "biopiracy." Africa is the origin of many important crops and genetic traits, developed by farmers and shared freely for thousands of years. But corporations fail to acknowledge the value of African farmers' contribution to crop diversity, and instead claim traits, patents, and profits for themselves.

The history, successes, and setbacks of the anti-GMO African movement

The African Biodiversity Network (ABN) is a network of African organizations in the largely English-speaking East, Southern, and West Africa. Through capacity building, and sharing of information, experiences, and strategies, ABN has supported local groups to engage with governments, farmers, and media, to challenge the push for GM crops.

Campaigners in Kenya finally lost their battle against the introduction of weak biosafety laws in 2009, after initially succeeding in getting the unacceptable 2004 and 2007 draft biosafety bills thrown out of parliament. Public statements and actions by the then Agriculture Secretary, William Ruto, led to accusations from civil society that he was keen to force GMOs on Kenya by whatever means. Campaigners criticized the secrecy in which the 2009 Bill was drafted, and the difficulty for the public to review a copy. In 2009 Ruto forced the weak version of the Bill through.

In contrast, however, Ethiopian civil society groups and farmers' organizations were closely involved in the drafting of the country's biosafety legislation, which ensures that the country will take a precautionary approach to biotechnology in the face of scientific uncertainty and divided opinion among experts. The law has effectively blocked any planting of GM crops in the country, although it has come under attack by resentful biotechnologists.

South Africa has a long history of anti-GM campaigning since 1999, with some successes and some failures. The South African Freeze Against Genetic Engineering (SAFeAGE) network was formed in 1999 to aligna wide range of civil society organizations. Their first campaign was to insist on a moratorium on GMOs. The African Centre for Biosafety is now taking the lead on challenging GMO permit approvals. Thus South African activists have successfully managed to stop GM wheat, canola, potato, and sorghum. As a result of these watchdog actions, the South African government is now more thorough in their decision-making processes. Furthermore, due to persistent advocacy efforts, South African civil society succeeded in getting the monitoring of GMOs included in the Biodiversity Bill, and influenced the recently-approved Consumer Act to include compulsory labeling of GMOs. In addition, they are currently engaged in an anti-competition case with two large GM seed companies.

The case of resistance against GM food aid in Zambia grabbed the headlines in 2002 and highlighted many issues, including the fact that food can be sourced locally to avert famine, and all this requires is political will. This resistance to GMOs by the Zambian government has been an inspiration to farmers and consumers around Africa.

In Francophone West Africa, farmers' organizations and civil society have formed a network, the

Coalition for the Protection of Africa's Genetic Heritage (COPAGEN), to resist GMOs and to promote and defend Africa's genetic heritage. They have been educating the public and scientists, organizing caravans to raise awareness and lobbing governments. This resistance is partly the reason why GMOs are taking so long to arrive in West Africa. In Mali and Benin the resistance has been particularly strong, with Benin managing to implement two consecutive five-year moratoriums. Mali held a citizen's jury in 2006 and the outcome showed that neither farmers nor consumers want GM crops in Mali.

In 2009, Friends of the Earth Nigeria and a coalition of Nigerian activists strongly resisted the introduction of GM cassava and have so far managed to keep it at bay. Nigerians call cassava their "gold." Earlier in 2006 and 2007 Friends of the Earth Africa groups tested and exposed the presence of the unauthorized GM LibertyLink rice in the markets of Ghana, Nigeria and Sierra Leone.

Africa's resistance is led by many farmers' organizations, particularly those representing small scale farmers, who vocally oppose the introduction of GMOs. These organizations have large memberships across the continent, such as the Francophone network ROPPA (Network of Farmers' and Agricultural Producers' Organisations of West Africa), ESAFF (Eastern & Southern Africa Farmers' Forum) and La Via Campesina.

The scientific debates in Africa on the biosafety issues and economic performance of GMOs

As a result of their obligation under the Biodiversity Act to provide oversight on GMOs, the South African National Biodiversity Institute (SANBI) released its first study on the impacts of Monsanto's MON 810 maize on the environment in January 2011. The study found that insects have developed resistance to the Bt maize, and that this has been exacerbated by cross-pollination with local maize varieties. Also, the study demonstrated that current refugia[103] were insufficient to solve the problem.

The study also examined at the molecular level the claim of "substantial equivalence" between GM and non-GM crops. "Substantial equivalence" is the term used to describe the false assumption that a GMO is the same as a non-GMO. They found that Monsanto's Bt gene was significantly different in size to the naturally occurring form, and that the size and expression of certain proteins differed between the varieties - thus undermining the substantial equivalence claim. This study is important as it sets a precedent in that an African government has actually undertaken independent and critical research on GMOs.

The University of the Free State in South Africa runs an independent testing laboratory for GMO detection in agricultural products, and has also conducted some independent and critical research on GM contamination, looking into GM presence in foodstuffs and pollination distances in maize. Contamination is a big issue in Africa as Africans migrate and seeds spread easily from one country to another. Food and seeds, just like pesticides, are often dumped on unsuspecting Africans – either as food aid or via market distribution. In 2006 there was an uproar when GM rice (LibertyLink

[103] A refugia is an area that has escaped ecological changes occurring elsewhere

rice), which has not been proved suitable for human consumption, was found in West Africa where rice is a very important crop.

The Hazards of The Alliance for a New Green Revolution in Africa (AGRA)

The Alliance for a New Green Revolution in Africa (AGRA) is a consortium of industry, institutes, banks, and NGOs, working to massively increase use of "Green Revolution" agricultural technologies (i.e., fertilisers, pesticides and hybrid seeds) by African small-scale farmers.. AGRA's focus is on changing agricultural practice, infrastructure, and policy across Africa. A key strategy is to facilitate farmers' access to loans in order to buy specific brands of fertiliser, pesticide, and seeds. The programme has received many millions of dollars in funding from billionaires such as the Bill & Melinda Gates Foundation and Warren Buffet. Its headquarters are in Nairobi, Kenya, but the programme operates across Africa, initiating programmes, creating partnerships with credit unions, developing sales infrastructure, and working with farmers through NGOs. With Kofi Annan as a high-profile chairman of the board, AGRA's growth and influence in just a few short years has been widespread and prolific.

AGRA's stated aim is to increase food security in Africa, however, the programme fails to acknowledge the inherent risks that dependence on fertilisers, pesticides, hybrid seeds and debt bring to farmers. The "Green Revolution" in fact increases farmers' vulnerability to climate change, by reducing seed diversity, biodiversity, and soil fertility and capacity to hold water. In Africa, rainfall is increasingly erratic and unpredictable. Farmers are more likely to lose their crops, and could face disastrous economic hardship by following this industrial agricultural paradigm.
Many NGOs and farmers' organisations are deeply suspicious of AGRA's ultimate aims. While AGRA claims that it wishes to establish food security, in practice, it is opening up huge new markets for the agribusiness industry by persuading millions of African farmers to become dependent on their seeds and chemicals.

Furthermore, while AGRA has so far claimed that it currently has no plans to promote GMOs through the programme, there are strong indications that by getting farmers hooked on buying seed instead of saving their own, this will lay the groundwork for GMOs to enter Africa on a large scale. The programme's main funder, Bill Gates, has given millions of dollars towards the development of GM crops in Africa, and has clearly stated his belief that GMOs are part of the solution to hunger in Africa. Several former Monsanto staff work for the Gates Foundation, whose portfolio has invested in more than $23 million of shares of Monsanto stock. Thus, in spite of AGRA's vague position on GMOs, it is speculated that this will prove to be a key strategy for the technology's entry into Africa.

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With thanks to: Nnimmo Bassey (Friends of the Earth Africa); Mamadou Goita, (COPAGEN, Mali); Mariam Mayet & Haidee Swanby (Africa Centre for Biosafety, South Africa); Rose Williams (Biowatch, South Africa).

IV. VOICES FROM GRASS ROOTS

D. Asia Pacific

INDIA : Monsanto in India - A Story of Corruption, Biopiracy, Seed Monopoly and Farmers Suicides

*Dr. Vandana Shiva, Navdanya**

A Monsanto ad in the Economist (August 13-19, 2011) announces "India delights as cotton farmers lives transform for the better". The reality is that cotton farmers in India have been pushed into debt and suicide with the entry of Monsanto in the cotton seed sector since the 90's. Most of the 250,000 farmers suicides since then are in the cotton belt. And cotton is now monopolised by Monsanto's GMO Bt Cotton seeds.

A senior Monsanto official, Consuelo Madera, Vice President, Asia said "India is a huge opportunity in cotton, corn and vegetables. It is attractive because of well developed intellectual property rights…" (Ref : Monsanto Bets Big on India, Mulls Corn Foray, The Economic Times, 16th August, 2011).

If every farmer can be forced to give up their seed sovereignty and become dependent on Monsanto's genetically engineered patented seeds, Monsanto will make trillions of dollars of profits in royalty collection.

India a land rich in biodiversity and small farmers is clearly a big market for Monsanto. If what happened with Bt Cotton happens with every crop India's small farmers and biodiversity will be exterminated. Beginning with Bt Cotton in 1998, Monsanto has been violating laws, corrupting governments, engaging in biopiracy, creating seed monopolies, destroying biodiversity and pushing small farmers into debt and suicide.

Monsanto's takeover of the seed supply is not a result of market processes. It is a result of corrupt influence over government, the undemocratic enclosure of the seed commons, false claims and distortion of science.

Either Monsanto blatantly violates the laws, or it has laws changed through its influence. It changes policies to privatise the seed and make farmers dependent on its seed monopoly. It corrupts Governments and policy makers. It corrupts knowledge and science. It corrupts biodiversity through genetic contamination and genetic pollution

Monsanto was an architect of the Trade Related Intellectual Property Rights Agreement (TRIPS) of WTO through which it is establishing seed monopolies globally. As James Enyart of Monsanto said

"we were the patient, diagnostician and physician" in drafting the TRIPS agreement (Ref : James Enyart, A GATT Intellectual Property Code Les Xlonvelles, June 1990, 54-56)

Monsanto also sits on the board of the US-India Knowledge Initiative in Agriculture, a bilateral free trade agriculture agreement. It exercises undue influence on the U.S Government and the Government of India.

Illegal Entry of Monsanto's GMOs in India : The Story of Bt Cotton

1(a) What is Bt Cotton?

Bt toxins are a family of related molecules produced in nature by a soil bacterium, *Bacillus thuringiensis* (Bt). Farmers and gardeners have used natural Bt as an organic pesticide for more than 50 years. Bt genes are now being genetically engineered into crops so that the plant produces toxins throughout most of its life.

Genetically engineered Bt crops are being offered as a sustainable pest control strategy. However, the Bt crops are neither ecological nor sustainable. They are not ecological because internalising toxin production in plants is not a toxic free strategy — it merely makes toxics internal to plants rather than applied externally. The ecological impacts of this strategy of internalising toxics have not been looked at, though indications are emerging that genetically engineered Bt is harmful to beneficial insects such as bees and ladybirds.

The Bt crop strategy is not a sustainable method for pest control because Bt plants release toxins continuously. Constant long-term exposure of pest populations to Bt encourages survival of individual pests that are genetically resistant to the toxin. As Margaret Mellon and Jane Rissler of the Union of Concerned Scientists state in their report "Now or Never":

"Over many generations, the proportion of resistant individuals in pest populations can increase, reducing the efficacy of the Bt toxin as pesticide. If resistance evolves, Bt toxins will cease to be effective both for the users of the new transgenic plants and those who have relied on Bt sprays for decades. Scientists have estimated that widespread use of Bt crops could lead to the loss of Bt's efficacy against certain pest populations in as far as two to five years". (Fred Gould and Bruce Tabashnik, "Bt Cotton Resistance Management", in Mellon and Rissler, "Now or Never", Union of Concerned Scientists, 1998)

The primary justification for the genetic engineering of Bt into crops is that this will reduce the use of insecticides. One of the Monsanto brochures had a picture of a few worms and stated, "You will see these in your cotton and that's O.K. Don't spray". However, in Texas, Monsanto faced a law suit filed by 25 farmers over Bt cotton planted on 18,000 acres which suffered cotton boll worm damage and on which farmers had to use pesticides in spite of corporate propaganda that genetic engineering meant an end to the pesticide era. In 1996, 2 million acres in the US were planted with Monsanto's Bt transgenic cotton called Bollgard, which had genes from the bacteria *Bacillus thuringensis* (Bt). The genetically

engineered cotton generates a natural toxin to kill caterpillars of their pest: cotton bollworm, tobacco budworm and pink bollworm.

However, cotton bollworms were found to have infested thousands of acres planted with the new breed of cotton in Texas. Not only did the genetically engineered cotton not survive cotton bollworm attack, there are also fears that the strategy will create super bugs by inducing Bt - resistance in pests. The question is not whether super-pests will be created, but when they will become dominant. The fact that Environment Protection Agency (EPA) of the U.S. and the GEAC in India requires refugia of non-engineered crops to be planted near the engineered crops reflects the reality of the creation of resistant strains of insects. In 2010, Monsanto admitted that the bollworm had become resistant to its genetically engineered Bt Cotton in India.

The widespread use of Bt containing crops could accelerate the development of insect pest resistance to Bt, which is used for organic pest control.

The genetically engineered Bt crops continuously express the Bt toxin throughout its growing season. Long term exposure to Bt toxins promotes development of resistance in insect populations.

1(b) Illegal Entry of GMOs in India

In 1998, Monsanto with its Indian partner Mahyco, started illegal field trials in India, without approval of Genetic Engineering Approval Committee (GEAC), the statutory body for approving the release of GMOs into the environment.

India's biosafety laws are governed by the "Rules for the manufacture, use, import, export, and storage of hazardous micro-organisms, genetically engineered organisms or cells, 1989, framed under the Environment (Protection) Act, 1986.

As long as the genetic engineering is taking place in labs or in farms that are totally contained, the Review Committee on Genetic Manipulation (RCGM) of the Department of Biotechnology (DBT) governs the approval. The moment trials are conducted in the open environment or a genetically engineered organism is released into the environment, the Genetic Engineering Approval Committee (GEAC) governed by the Ministry of Environment and Forests (MoEF) become active under the Environment (Protection) Act (EPA) 1986.

Monsanto and Mahyco got clearances from the Department of Biotechnology, not the Genetic Engineering Approval Committee. The stamp of clearances for all the trials of genetically modified cotton came through the advisor, Review Committee of Genetic Manipulation (RCGM) through its letter dated 27th July 1998 and 5th August 1998 to Maharashtra Hybrid Seeds Company (Mahyco) to carry out multicentric trials on transgenic cotton *(Bacillus thuringiensis)* initially at 25 locations by permission dated 27th July 98 and thereafter 15 locations by permission dated 5th August 98 making 40 locations in 9 states. The date of sowing obtained from the individual farmers' by the Research Foundation for Science, Technology and Ecology (RFSTE) team show that the crop had been sown before the trial permissions were obtained in July 1998.

For the field trials Mahyco contacted the individual farmers based on prior acquaintances. Mahyco has been supplying farmers with new hybrid seeds for initial testing. Based on the performance of these new seeds, farmers patronized Mahyco over the years and established good rapport.

The genetically engineered Bt cotton seeds were also tested in the similar way. At most of the trial sites, farmers selected were the exemplary farmers who were singled out on the basis of their past performance in getting good yield of major crops in the previous cropping season. For instance, Sri Bassanna at Sindhanur district in Karnataka, was selected for the trial based on performance for best yield in paddy.

In some of the trial sites, Mahyco's own seed dealers were given Bt Cotton to test on their fields and recommend to other farmers through these dealers. Mahyco agreed to meet the expenditures incurred on the cultivation of the Bt crop on their fields.

In order to attract other farmers, Mahyco-Monsanto organised "khestra utsav" – "field festivals" to show the crop performance to other villagers from neighboring villages. Farmers are invited to the trial fields for exhibition of uncommonly high yields of branded seed. However, during shows organised by the Monsanto-Mahyco, the cost of technology was not been revealed to the farmers (which is associated with sale of genetically engineered seeds).

The Chronology of Illegal Field Trials of *Bt* Cotton

The sequence of events, which took place in implementing the illegal trials in India, can be briefly outlined as:

24th April 1998	Mahyco files application to Department of Biotechnology for field trials
May 199	Joint venture between Mahyco and Monsanto formed
13th July 1998	Letter of Intent issued by DBT without involving Genetic Engineering Approval Committee (GEAC).
15th July 1998	Mahyco agrees to conditions in letter of intent.
27th July 1998	Impugned permission by DBT for trials at 25 locations granted.
5th August 1998	Permission for second set of trials at 15 locations granted
6th January 1999	PIL filed by Research Foundation for Science Technology and Ecology in the Supreme Court of India
8th February 1999	RCGM expresses satisfaction over the trial results at 40 locations.
12th April 1999	RCGM directs Mahyco to submit application for trials at 10 locations before Monitoring and Evaluation Committee
25th May 1999	Revised proposal to RCGM submitted by Mahyco.
June–Nov 1999	Permission granted for different trial fields
Oct–Nov 1999	Field visits

May 2000	Mahyco's letter to GEAC seeking approval for "release for large scale commercial field trials and hybrid seed production of indigenously developed Bt cotton hybrids".'
July 2000	GEAC clears for large-scale field trials on 85 hectares and seed production on 150 hectares and notifies through press release.
October 2000	RFSTE filed an application for amendment in the petition challenging the fresh GEAC clearance.
18.10.2001	GEAC orders uprooting of "Navbharat-15", which was found to contain transgenic Bt
26.03.2002	32nd Meeting of the GEAC was held to examine the issue of commercial release of Bt Cotton. Members of GEAC from ICHR, Health Ministry, Commerce Ministry, CSIR, ICAR did not attend the meeting. Inspite of the absence of important members of the GEAC, approval was granted to three out of four of Monsanto - Mahyco's transgenic hybrids.
05.04.2002	Formal approval granted to Mech-12, Mech – 162 and Mech 184 by A.M. Gokhale, Chair of GEAC. Order of 05.04.2002 is a conditional clearance valid for three years. The stipulated conditions/restrictions are a clear implied admission on the part of the government that the tests are far from complete. In effect, the commercialisation was an experiment. Monsanto-Mahyco had been asked to gather further data and submit annual reports on the resistance that the insects develop over a period of time to GM seeds and to conduct studies on resistance to bollworm, susceptibility tests, and tests for cross pollination.
02.03.2005	In March, RFSTE releases results of continued failure of Bt Cotton, especially in Andhra Pradesh.
04.03.2005	GEAC rejects renewal of the 3 Bt Cotton varieties planted in the Southern States. However, other Bt varieties are cleared in Northern States.

1(c)False Promises, Failed Technology

Genetic engineering needs careful assessment because it allows the transfer of genes from one organism to a totally unrelated organism, crossing species barriers. This has consequences for the organism, for the environment into which it is released, and for the species which consume it as food.

It was these unpredictable consequences that led the founding fathers of genetic engineering or recombinant DNA research to call for a moratorium on genetic engineering at Asilomer, California in 1972. However genetic engineering was hijacked by Wall Street and the biotechnology industry and they started to rush GM crops with false promises to the market.

Not only are the consequences of genetic engineering unpredictable, the technology itself is unpredictable. It has been falsely projected by the biotechnology industry that because the manipulation of plants is at the genetic level, genetic engineering is more accurate and precise than conventional breeding. This is not true. There are only two tools used for current genetic engineering – one is the gene gun, the other is a plant cancer – Agrobacterium tumefacieus.

And in both tools, it is uncertain if the gene transfer is successful or where in the genome the introduced gene is inserted. Unlike machines, living organisms have the capacity to organize themselves. Introduced genes can function differently than predicted and they can move unpredictably into other organisms. Engineering is in fact an inappropriate word for genetic manipulation. Basically, a plant's genome (all of its genes taken together) is a block box. Genetic engineering takes a gene from one black box and forces it into a second black box, hoping that the new gene will be taken up. Most of the time the experiment fails. Once in a thousand times the foreign gene embeds itself in the recipient plant's genome, and the newly modified plant gains the desired trait. But that is all the technicians know. They have no idea where in the receiving plant's genome the new gene has found a home. This fundamental ignorance, combined with the speed and scale at which modified organisms are being released into the global ecosystem, raises a host of questions for the future on the safety of agriculture, of the environment and of human health (Against the Grain, Rachel's Weekly, 18 February 1999)

False Promises

Monsanto is involved in false propaganda and presenting exaggerated claims about the yield of Bt Cotton being 15-20, quintal per acre. The photograph of one Radhey Shyam has been shown on the poster of Monsanto. The poster claims that Radhey Shyam got 20 quintal per packet/per acre. However, the investigation revealed that Radhey Shyam got 20 quintal / 5 acres, which means that the actual yield is not more than 4 quintal per acre. For Monsanto, this is a normal way to advertise its seeds; there is nothing unethical.

The company pamphlet cleverly in very small print says "Crop management is beyond our control, for the crop yields farmers are entirely responsible." It is obvious that in the case of failure of seeds, the company wants to absolve itself from any responsibility. But the claims in bold and big letters totally contradicts what is written in small print.

A public hearing on Bt Cotton was conducted by the Agricultural Produce Marketing Committee, Kuchchlu in Madhya Pradesh. A number of allegations were made at the public hearing. Narendra Pawar from Khaparkheda recalls: "The seed company representatives would say anything to avoid responsibility. When we said the crops are dry, they said you needed more water. If we said the field was irrigated, they would say there was too much water. If we sowed in May, they said it was too early. Those who waited until July were told it was too late. They tried to say it was a fungus, but we split open the plants and there was no symptom of wilting owing to fungal infection. Then they began to say that we never gave any guarantee for high yields." (Zaidi Annie, "Failure in Nimar", Frontlilne, Chennai, 27 January, 2006).

This claim to higher returns is also falsified by multiple field surveys. A 2011 survey by Navdanya comparing Bt Cotton with organic cotton showed that organic producers earn nearly two times more than Bt Cotton farmers. Our earlier studies in A.P, M.P and Karnataka also show that non-Bt Cotton farmers have higher net incomes than Bt Cotton farmers.

Input / Output Bt / non-Bt / Desi Cotton Per Acre

	Bt Cotton	**Non Bt Hybrids**	**Desi Varieties**
Expenditure Input (seeds, fertilizers, pesticides, irrigation etc)	Rs. 9700/-	Rs. 5750/-	None
Total Yield	2 quintals	10 quintals	5 quintals
Output Value	Rs. 3300/-	Rs. 16500/-	Rs. 8250/-
Loss / Profit per acre	Loss – Rs. 6400/-	Profit – Rs. 10750/-	Profit – Rs. 8250/-

Cost Benefit Analysis – Madhya Pradesh

	Bt Cotton	Non Bt Varieties
Expenditure input (seeds, fertilizers, pesticides, irrigation, labour)	Rs. 6675/-	Rs. 7005/-
Expected total yield	4.01 quintals	7.05 quintals
Output Value	Rs. 7218/- (Rs. 1800/- quintal)	Rs. 12690/- (Rs. 1800/- quintal)
Profit per acre	Rs. 543/-	Rs. 5685/-

Cost Benefit Analysis – Karnataka

	Bt Cotton	Non Bt Varieties
Expenditure input (seeds, fertilizers, pesticides, irrigation, labour)	Rs. 8925	Rs. 10250/-
Expected total yield	3.82 quintals	7 quintals
Output Value	Rs. 7640/- (Rs. 2000/- quintal)	Rs. 14000/- (Rs. 2000/- quintal)
Loss / Profit per acre	Loss of Rs. 1285/-	Profit of Rs. 3750/-

A study by the Andhra Pradesh Coalition in Defense of Diversity (APCIDD) showed how biased the results of the Monsanto sponsored A.C Nielson study was.

Monsanto commissioned versus independent study

State	Bollworm Reduction	Pesticide Usage Reduction		Yield increase		Increase in Net Profit
Andhra Pradesh	%	Rs	%	Quintals/ Acre	%	Rs / Acre
Monsanto Study	58%	1856/-	24%	1.98	92	5138/-
Andhra Pradesh APCIDD Study	14%	321/-	2%	0.09	(-)9%	(-) 750/-

Failed Technology

Inspite of Indian studies showing losses to farmers and inspite of the first Bt varieties not getting approval because of bad performance, and inspite the Government of Andhra Pradesh suing Monsanto for Bt Cotton failure, Monsanto keeps using scientists to put out pseudo studies that claim that Indian farmers have benefited from Bt Cotton.

The first fake study was published by Martin Quaim of the Center for Development Research at the University of Bonn and David Zilberman at the Department of Agricultural and Resource Economies at the University of California, Berkeley, in the Journal "Science" as a report on "field effects of Genetically Modified Crops in developing countries".

Quaim and Zilberman did not carry out primary field investigations. They used data provided by Monsanto Mahyco to claim that pesticide use was reduced by 70%, and yield increase was 80% Quaim and Zilberman later stated that "Mahyco – Monsanto neither supplied the data nor funded the research", yet at Ref. 30(2) of their paper, Quaim and Zilberman thanked Mahyco "for making the field trials records available" and in Ag Bio View, Feb 21, 2003, M. Quaim wrote "we have used the company field trial records about the pest infestation levels, such as larval counts per plant. These were collected during weekly trial visits by local company agronomists, and we received the complete bundle of handwritten field records, not just aggregated summary statistics". The Quaim and Zilberman study is therefore a Monsanto – Mahyco study.

Our studies show that farmers had to continue to use pesticides even during the field trials.

Number of Chemical Sprays on Bt Cotton by the trials farmers (1998-99)

Name & Location of Farmer	**Number of Sprays on Bt Crop**
Mr. Surinder Singh Hayer, Punjab	5 to 6 times spray of chemicals
Mr. Lehri Singh, Hissar, Haryana	3 times spray of chemicals
Mahyco R.D Centre, Gurgaon, Haryana	3 to 5 spray of chemicals
Mr. B.V. Nanjundappa, Bellary, Karnataka	4 times spray of chemicals
Mr. V. Thirupalliah, Kurnool, A.P	4 times spray of chemicals

Source : Compilation from RFSTE Primary Survey, 1998

In 2005, Monsanto used two more pseudo scientists, Brookes and Barfoot to claim 54% increased yields and incomes for farmers (in Bija Volume 39, 9. 4-5). Again, none of them carried out field studies but used company provided data.

Monsanto's manipulations of data is evident from the fact that in 1998, State Governments had uprooted most of the Bt cotton in the trial sites, since Monsanto had not gone through the appropriate approval procedures. Farmers had also uprooted and burnt Bt Cotton in Karnataka and Andhra Pradesh. Yet Monsanto – Mahyco had data for 40 trials sites showing their data is created on paper and not generated authentically in the field.

Navdanya / RFSTE have been monitoring Bt Cotton since the trials in 1998. We have also introduced organic cotton in Vidarbha. While the net income of organic cotton farmers is Rs. 8000 per acre, the average income of Bt Cotton farmers is Rs. 4168.13 in 2011.

The International Food Policy Research Institute (IFPRI) released a discussion paper "Bt-cotton and Farmers' Suicides in India: Reviewing the Evidence".

The report is manipulative of the truth about farmers suicides and Bt-cotton.at every level.

Firstly, it states that "Farmers suicides is a long-term phenomena", and the "long term" is 1997-2007.

Ten years is not a long term in a 10,000 year old farming tradition. And 1997 is precisely when the suicides take on an epidemic proportion due to seed monopolies, initially through hybrids and from 2002 through Bt Hybrids.

Secondly, the chronology of Bt-cotton introduction is false. The story begins with Monsanto's illegal Bt trials, not with commercialisation in 2002.

Secondly, the report states that "In specific regions and years, where Bt-cotton may have indirectly contributed to farmer indebtedness (via crop failure) leading to suicides, its failure was mainly the result of the context or environment in which it was introduced or planted; Bt-cotton as a technology is not to blame".

This is an interesting argument. A technology is always developed in the context of local socio-economic and ecological conditions. A technology that is a misfit in a context is a failed technology for that context. You cannot blame the context to save a failed technology.

The technology of engineering Bt-genes into cotton was aimed primarily at controlling pests. However, new pests have emerged in Bt-cotton, leading to higher use of pesticides. In Vidharbha region of Maharashtra, which has the highest suicides, the area under Bt-cotton has increased from 0.200 million ha in 2004 to 2.880 million ha in 2007. Costs of pesticides for farmers has increased from Rs. 921

million to Rs. 13,264 billion in the same period, which is a 13 fold increase. A pest control technology that fails to control pests might be good for seed corporations which are also agrichemical corporations. For farmers it translates into suicide.

The IFPRI study uses industry data to falsely claim reduction of presticide use in Bt-cotton when the empirical data and ground reality shows pesticide use increase.

There are alternatives to Bt-cotton and toxic pesticides. Through Navdanya we have promoted 'Organic Farming and Seeds of Hope', to help farmers move away from Monsanto's "Seeds of Suicide".

The field data of Bt-cotton is also manipulated when cotton yields are shown as low in the pre-Bt-cotton years, it is not mentioned that cotton has traditionally not been grown as a monoculture but as a mixed crop. Converting biodiversity to monocultures of course leads to increase in "yield" of the monoculture, but this is accompanied by a decline in production at the biodiversity level.

The IFPRI paper has attempted to play with figures, just like the investment bankers and hedge fund managers played with figures and caused the collapse of Wall Street. Manipulation of reality with numbers does not make for truth. In the case of seeds, it is threatening farmers' lives.

Technologies are tools. When the tool fails it needs replacing. Bt-cotton technology has failed to control pests or secure farmers lives and livelihoods. It is time to replace GM technology with ecological farming. It is time to stop farmers' suicides.

Monsanto has repeatedly and falsely argued that Bt Cotton transformed India from an importing to an exporting country. However, in 1998, India exported 1.5 million bales of cotton. In 2001-2002, India was importing 2.6 million bales. This was a consequence of trade liberalization, the removal of Quantitative Restrictions, and dumping of subsidized cotton by the U.S. While the cost of cultivation of 1 kg of cotton lint was $1.8 in the U.S, U.S was selling cotton in the international market at $1.0 per kg of cotton lint. (Vijay Jawandia, 2006, Memorandum presented to Pascal Lamy, President of WTO on 5th April 2006).

Imports were related to import liberalization, and went down not because of Bt Cotton but because a dispute was initiated in WTO against the U.S because of its cotton subsidies and dumping. This was also the reason for the failure of the WTO meeting in Cancun.

There is no correlation between cultivation of Bt Cotton and exports. IN 2007-2008, cotton was cultivated on 9.4 million hectares, and exports were 8.85 million bales. In 2010-2011, cotton was cultivated on 10.61 million hectares, with 95% being Bt Cotton and exports were down to 4.95 million bales.

1 (d) Is Genetic Engineering Liberating Women?

In yet another example of the desperate "science" of Monsanto and Company, it is now being argued that Bt Cotton has liberated Indian women in the region of Vidharbha, Maharashtra which records the largest acreage under Bt Cotton and highest rate of farmers suicides. Arjunan Subramanian of HRI Warwick, Dr. Kerry Kirwan, Professor David Pink and Martin Qaim have put out a paper which says that Bt Cotton produces massive gains for women's employment in India. This is one more in a line of earlier papers by Martin Qain giving a spin that Bt Cotton is creating miracles even while hundreds of thousands of Bt Cotton farmers commit suicide. Arjunan Subramanian is Qaim's student and Qaim represents Monsanto & Co. Every "study" done by him is public relations for Monsanto. The present paper is no different.

Every level of the paper is fraudulent. First, the argument that women have been empowered because of the introduction of Bt Cotton.

This is false on many grounds. Firstly, women have traditionally been seed keepers and seed breeders. The knowledge and skills related to seed conservation and seed breeding have been women's expertise. The seed economy was a women's economy. As long as seed was in women's hands, there was no debt and no suicides. Women have acted as custodians of the common genetic heritage through the storage and preservation of grain and seeds. In a study of rural women of Nepal, it was found that seed selection is primarily a female responsibility. In 60.4 percent of the cases, women alone decided what type of seed to use, while men decided in only 20.7 percent. As to who actually performs the task of seed selection in cases where the family decides to use their own seeds, this work is done by women alone in 81.2 percent of the households, by both sexes in eight percent and by men alone in only 10.8 percent of the households.

Throughout India, even in years of scarcity, grain for seed was conserved in every household, so that the cycle of food production was not interrupted by loss of seed. The peasant women of India have carefully maintained the genetic base of food production over thousands of years. This common wealth, which had evolved over millennia, was defined as 'primitive cultivars' by the masculinist view of seeds, which saw its own new products as 'advanced' varieties.

The replacement of traditional varieties of seeds with genetically engineered Bt Cotton is an appropriation of women's skills, knowledge and decision making on issues related to seed by corporations like Monsanto. This is disempowerment of women, not empowerment.

Secondly, women have played significant role in agriculture. As I wrote in report for the FAO, most farmers in India are women. The replacement of biodiverse cropping systems evolved by women with monocultures of Bt Cotton imposed by Monsanto leads to decline of food production. This undermines women's food sovereignty and erodes food security. Food security in women's hands is women’s empowerment. Destruction of food security by destroying food crops undermines women's food sovereignty. This is women's disempowerment,not empowerment.

Further, it destroys women's work related to agricultural production and post harvest processing and food processing. Interestingly women's work related to food sovereignty has been defined as "femimanual" work.

Agriculture, the growing of food, is both the most important source of livelihood for the majority of the world people, especially women, as well as the sector related to the most fundamental economic right, the right to food and nutrition.

Women were the world's original food producers, and continue to be central to food production system in the Third World in terms of the work they do in the food chain. The worldwide destruction of the feminine knowledge of agriculture evolved over four to five thousand years, by a handful of white male scientists in less than two decades has not merely violated women as experts; since their expertise in agriculture has been related to modeling agriculture on nature's methods of renewablility, its destruction has gone hand in hand with the ecological destruction of nature's processes and the economic destruction of the poorer people in rural areas.

Women's work in the food system is based on their knowledge and skills. It is an exercise of their food sovereignty. Destroying women's food related work is dis-empowerment, not empowerment. In the Deccan area, cotton was not grown as a monoculture. It was grown with sorghum and pigeon pea and chilies. The knowledge of these biodiverse systems was women's knowledge. The erosion of biodiverse systems goes hand in hand with erosion of women's knowledge and their power related to knowledge. Women's work and power in the food system has declined as a result of the introduction of monoculture Bt Cotton.

This decline in women's knowledge, work and power with the introduction of Bt Cotton is perversely hidden. The monoculture of the mind, focusing only on Bt Cotton, falsely projects women's dependence on cotton picking as increase in employment and empowerment. And a second falsehood introduced is that the increase in cotton picking is because of increased "yields" of Bt Cotton.

Patriarchal science and technology have rendered women's knowledge and productivity invisible by ignoring the dimension of diversity in agricultural production. As the FAO report on Women Feed the World mentions, women use more plant diversity, both cultivated and uncultivated, than agricultural scientists know about. In Nigerian home gardens, women plant 18 – 57 plant species. In Sub-Saharan Africa women cultivate as many as 120 different plants in the species left alongside the cash crops managed by man. In Guatemala, home gardens of less than 0.1 ha have more than ten tree and crop species.

In a single African home garden more than 60 species of food producing trees were counted. In Thailand, researchers found 230 plant species in home gardens. In Indian agriculture women use 150 different species of plants for vegetables, fodder and health care. In West Bengal 124 "weed" species collected from rice fields have economic importance for farmers. In the Expana region of Veracruz,

Mexico, peasants utilize about 435 wild plant and animal species of which 229 are eaten. Women are the biodiversity experts of the world.

Women's work in cotton picking which Monsanto and Co. celebrate and project as an increase in absolute terms has increased because monocultures have replaced mixed cultivation of cotton with food crops. The increase in cotton is because of the replacement of biodiverse farming with cotton monocultures, and the expansion of acreage under cotton. It is not because of higher yields of Bt Cotton. The introduction of the Bt Gene into crops is not a yield increasing technology. It is a toxin production technology. All that increases is production of toxin. The yield traits come from the hybrid into which the Bt gene is introduced. This is the case of cotton in India. It is also the case of all genetically engineered crops as shown by Doug Sherman in the report "Failure to Yield" of the Union of Concerned Scientists.

The manipulated paper [by Subramanian and Qaim et al] says that women's additional work as cotton pickers reduces their household work which men do. However, men in the Bt Cotton area are not becoming house husbands. They are committing suicide because of the high levels of indebtedness. Seed that used to cost Rs. 7 / kg became Rs. 3600 / kg with the introduction of Bt Cotton. The Monopoly and Restrictive Trade Practices Commission forced Monsanto to reduce prices in response to a case brought by the Andhra Pradesh Government which argued that high prices were killing farmers. The case on seed monopolies and high seed prices still continues.

In addition, even though Bt Cotton is supposed to control pests, the bollworm has become resistant and new pests have emerged. Farmers in Vidharbha are using 13 times more pesticides than they did for conventional cotton. High costs of seeds and pesticides lead to debt, debt leads to suicides, creating Bt Cotton widows, not liberated "housewives".

The tragedy of thousands of widows in Vidharbha, with the majority traced to debt linked to Bt Cotton is now being covered up with the latest spin from Monsanto & Co. that Bt Cotton has liberated the women of Vidharbha.

1(e) Bt crops create pests and increase pesticide use

Genetically engineered Bt crops introduce a gene to produce a toxin into the plant, so that the plant becomes its own pesticide factory. This is supposed to control pests. However, Bt crops have created pests and increased pesticide use.

The more the biotechnology industry talks of science, the more it undermines it. Bt Cotton and Bt Brinjal illustrates this so well.

The rationale for Bt crops is unscientific because it does not compare all available options for pest control, and it does not fully assess the performance of Bt crops as a pest control strategy.

The GMOs are based on the false assumption that genetically engineered Bt crops like Bt Cotton and Bt Brinjal are an alternative to the use of chemical pesticides for pest control.

Proponents do not address the real alternative to chemical agriculture which is organic farming based on the principles of agro-ecology. Biodiverse organic farming controls pests at the systems level by enhancing pest-predator balance and by growing crops with pest and disease resilience. Increasing ecological balance and resilience are the only effective and sustainable strategies for controlling pests. The 500,000 members of Navdanya know this through practice. Research on agro-ecology confirms that ecological / organic farming systems reduce pests and have no need for the use of pesticides.

In Indonesia, restrictions were introduced on the use of 57 pesticides in rice-growing, and subsidies for pesticides were eliminated. From 1987 to 1990, the volume of pesticides used on rice fell by over 50 per cent, while yields increased by about 15 per cent. Farmers' net incomes increased by $I8 per farmer per season. The Government saved $120 million per year by ending pesticide subsidies. (Thrupp, 'New Partnerships for Sustainable Agriculture', 1997)

In Bangladesh the 'No Pest' programme led to pesticide reduction of 76 per cent and yield increases of 11 per cent. Returns increased by an average of 106 per cent in the dry season and 26 per cent in the wet season (Thrupp, 'New Partnerships for Sustainable Agriculture', 1997)

Bt crops are promoted by ignoring the real alternative to chemical pesticides – organic farming. The panel on Bt Brinjal has distorted the organic alternative in its "responses". Instead of seeing organic as a farming system, it has reduced it to external inputs. The report states "In organic farming, the pest management totally relies on the use of botanical insecticides like neem oil, pongam oil, illupai oil or seed kernel extracts or leaf extracts which act as repellent, antiferdant or in some cases as toxins. None of the botanical pesticides are expected to perform well against the fruit and shoot borer (FSB) since the pest hides itself from the sprays while staying inside the fruits / shoot borer" (p.60)

This is an unscientific and false representation of the agro-ecological principles on which we have built the organic movement. Organic / ecological farming is not an input substitution system. It recognizes and respects the ecological processes through which pests are controlled and it also recognizes the processes through which pests are created.

Pests are created through –

1. Promotion of monocultures
2. Chemical fertilization of crops which makes plants more vulnerable to pests
3. Emergence of resistance in pests
4. Killing of friendly species which control pests and disruption of pest-predator balance

Bt crops are not an alternative to these pest creating systems. They are a continuation of a non-sustainable strategy for pest control which instead of controlling pests creates new pests and super pests. Bt Brinjal, like Bt Cotton, is grown as a monoculture, and is part of the package of chemical

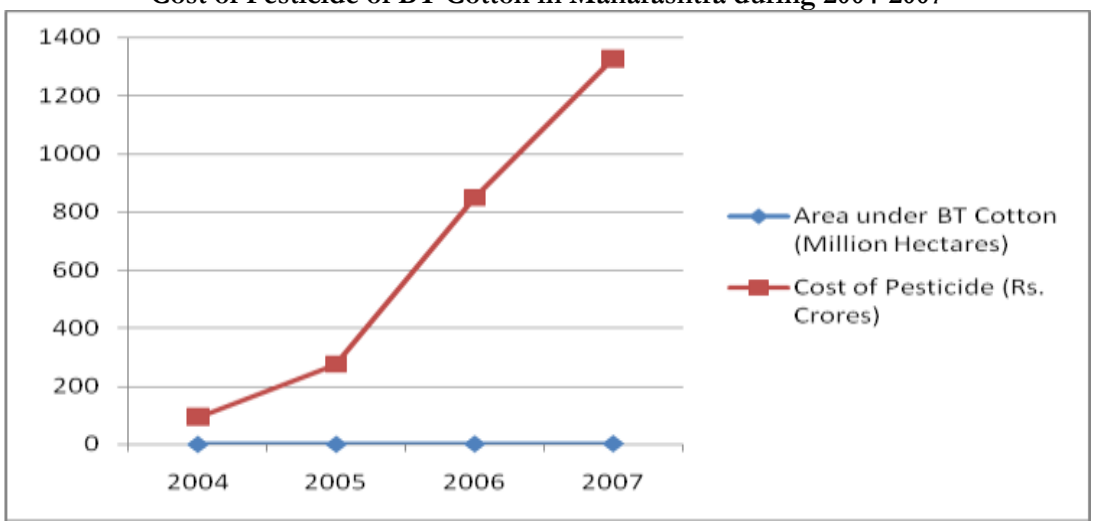
farming. Bt Cotton, like Bt Brinjal, was supposed to control the lepidopteron insects. In the case of cotton, the pest was the bollworm. In the case of Bt Brinjal it is the fruit and shoot borer.

In Bt Cotton we have witnessed the emergence of new non target pests and diseases such as aphids, jassids, army bug, mealy bug and "laliya". This has led to an increase, not a decrease in pesticide use. Navdanya field studies show a thirteen fold increase in pesticide use in Vidharbha after the introduction of Bt Cotton.

Area under BT Cotton and cost of Pesticide in Maharashtra

Year	**Maharashtra**	
	Area under BT Cotton (Million Hectares)	Cost of Pesticide (Rs. Crores)
2004	0.200	92.10
2005	0.607	273.45
2006	1.840	847.32
2007	2.880	1326.24

Cost of Pesticide of BT Cotton in Maharashtra during 2004-2007



Genetically engineered Bt crops also contribute to emergence of resistance in the target pests. The bollworm becomes resistant to the Bt toxin when every cell of the plant releases it in high doses all time. The need for refugia and the introduction of Bollgard II are evidences of the emergence of resistance in pests as a result of using GM Bt technologies.

The real cost benefit calculation and comparison should be between organic cultivation based on open pollinated seeds that farmers can save and Bt cropsl whose seeds farmers must buy every year, and which will be susceptible to new pests for which more pesticides will need to be used.

In an honest and scientific assessment, benefits of biodiverse organic farming outweigh the "benefits" of Bt Cotton. Navdanya's organic farmers have increased their incomes two fold when they shifted from Bt Cotton to organic cultivation.

In 2010, Monsanto admitted that bollworm had become resistant to its Bollgard I. It then introduced Bollgard II with two Bt genes. Monsanto's Bt cotton created new pests and led to emergence of resistance in the bollworm. Monsanto is now planning to introduce Bollgard II Round Up Ready Flex Cotton that in addition to Bt toxin has genes for Round Up Resistance. It will be followed by Bollgard III, with three Bt genes. The toxic treadmill serves Monsanto well, but locks farmers into dependency of ever increasing seed and pesticide costs, which will push them deeper into debt and suicide. (Ref : Monsanto Bets Big on India, Economic Times, 16th August, 2011)

2(a) Seed Monopolies, Genetic Engineering And Farmers Suicides

An epidemic of farmers' suicides has spread across four states of India over the last decade. According to official data, more than 250,000 farmers have committed suicide in India since 1995.

These four states are Maharashtra, Andhra Pradesh, Karnataka and Punjab. The suicides are most frequent where farmers grow cotton and have been a direct result of the creation of seed monopolies, first with hybrids, followed by Bt Cotton.

Increasingly, the supply of cotton seeds has slipped out of the hands of the farmers and the public system, into the hands of global seed corporations like Monsanto. The entry of seed MNCs was part of the globalization process. Under World Bank pressure and WTO rules India was forced to open its seed sector to global companies. This is how Monsanto entered India and introduced Bt Cotton.

Corporate seed supply implies a number of shifts simultaneously. Firstly, giant corporations start to control local seed companies through buyouts, joint ventures and licensing arrangements, leading to a seed monopoly.

Secondly, seed is transformed from being a common good, to being the "intellectual property" of Monsanto, for which the corporation can claim limitless profits through royalty payments. For the farmer this means deeper deBt

Thirdly, seed is transformed from a renewable regenerative, multiplicative resource into a non-renewable resource and commodity. Seed scarcity and seed famines are a consequence of seed monopolies, which are based on non-renewability of seed, beginning with hybrids, moving to genetically engineered seed like Bt- cotton, with the ultimate aim of the "terminator" seed which is engineered for sterility. Each of these technologies of non-renewability is guided by one factor alone – forcing farmers to buy seed every planning season. For farmers this means higher costs. For seed corporations it translates into higher profits.

Fourthly, the creation of seed monopolies is based on the simultaneous deregulation of seed corporations, including biosafety and seed deregulation, and super-regulation of farmers seeds and varieties. Globalization allowed seed companies to sell self-certified seeds, and in the case of genetically engineered seed, they are seeking self-regulation for biosafety. This is the main aim of the recently proposed Biotechnology Regulatory Authority of India, which is in effect a Biosafety Deregulation Authority The proposed Seed

Bill 2004, which has been blocked by a massive nationwide Gandhian Seed Satyagraha by farmers, aims at forcing every farmer to register the varieties they have evolved over millennia. This compulsory registration and licensing system robs farmers of their fundamental freedoms.

State regulation extinguishes biodiversity, and pushes all farmers into dependency on patented, corporate seed. Such compulsory licensing has been the main vehicle of destruction of biodiversity and farmers rights in U.S. and Europe.

Fifthly, corporate seeds impose monocultures on farmers. Mixed croppings of cotton with cereals, legumes, oilseeds, vegetables is replaced with a monoculture of Bt-cotton hybrids.

CHANGING PATTERN OF MAJOR CROPS IN THE MAIN AGRICULTURAL DISTRICTS OF VIDARBHA (Hectares)

	Districts	**2002 -03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-2011**
Jowar	Buldhana	1168	1080	1019	935	715	763	570	574	520
	Akola	831	823	8822	866	8458	759	620	546	435
	Washim	627	593	525	491	506	450	370	261	223
	Amravati	1029	1002	928	941	947	932	600	491	491
	Yavatmal	1394	1291	1151	1150	835	835	800	704	707
Total		5049	4789	4445	4383	3848	3739	2960	2576	2376
Moong	Buldhana	933	958	882	654	606	720	540	314	552
	Akola	643	643	620	501	520	680	730	349	615
	Washim	556	506	422	316	336	550	430	222	343
	Amravati	735	695	572	586	663	760	650	371	605
	Yavatmal	516	408	326	262	131	530	150	121	114
Total		3413	3210	2822	2323	2256	3240	2420	1377	2259
Soya-bean	Buldhana	786	879	1412	1625	1727	1840	1975	2625	2281
	Akola	272	308	503	541	598	602	980	1556	1218
	Washim	911	113	1851	1966	2048	1946	2010	2488	2082
	Amravai	1565	1550	1671	1812	2167	2203	3225	3176	2677
	Yavatmal	807	989	1763	2125	2681	2681	2780	2867	1873
Total		4341	4851	7200	8069	9221	9272	10970	12712	10131
Cotton	Buldhana	1683	1831	1987	1975	2344	2426	2430	2444	2625
	Akola	2229	2177	2076	2044	2049	2060	1740	1641	1681
	Washim	3860	752	678	668	622	606	515	499	633
	Amravati	2790	2666	2682	2564	2418	2277	1490	1794	2076
	Yavatmal	4033	3760	3328	3240	4135	4135	4020	4053	4898
Total		11595	11186	10751	10491	11568	11504	10195	10431	11813

* Estimated Area for 2008-09

The creation of seed monopolies and with it the creation of unpayable debt to a new species of money lender, the agents of the seed and chemical companies, has led to hundreds of thousands of Indian farmers killing themselves since 1997.

The suicides first started in the district of Warangal in Andhra Pradesh. Peasants in Warangal used to grow millets, pulses, oilseeds. Overnight, Warangal was converted to a cotton growing district based on non-renewable hybrids which need irrigation and are prone to pest attacks. Small peasants without capital were trapped in a vicious cycle of deBt Some ended up committing suicide.

This was the period when Monsanto and its Indian partner Mahyco were also carrying out illegal field experiments with genetically engineered Bt- cotton.

We at the Research Foundation for Science, Technology and Ecology used these laws to stop Monsanto's commercialization of Bt- cotton in 1999, which is why approval was not granted for commercial sales until 2002.

The Government of Andhra Pradesh filed a case in the Monopoly and Restrictive Trade Practices Act (MRTP), India's Anti Trust Law, arguing that Monsanto's seed monopolies were the primary cause of farmers' suicides in Andhra Pradesh. Monsanto was forced to reduce its prices of Bt- cotton seeds.

The high costs of seeds and other inputs were combined with falling prices of cotton due to $4billion U.S. subsidy and the dumping of this subsidized cotton on India by using the W.T.O. to force India to remove Quantitative Restrictions on agricultural imports. Rising costs of production and falling prices of the product is a recipe for indebtedness, and debtedness is the main cause of farmers' suicides. This is why farmers' suicides are most prevalent in the cotton belt which, on seed industries own claim, is rapidly becoming a Bt-cotton belt. Hybrid seeds and Bt-cotton is thus heavily implicated in farmers' suicides.

2(b) Cotton Seed Monopoly

India was a first country in the world to commercialise cotton hybrids. The first cotton hybrids H-4 was produced by Gujarat Agriculture University Public sector research programme released many hybrids for central zone (Gujarat, Maharashtra, Madhyapradesh) south zone (Andhra Pradesh, Karnakta and Tamilnadu) in late 1970s and early 1980s. Hybrids for Punjab & Rajasthan were released only in 1990s (Milind Murugukar, "Competition and Monopoly in Indian Cotton Seed Market", Vol. XLII, No. 37, September 15-21, 2007, Economic Weekly, Mumbai).

Since the beginning of farming, farmers have sown seeds, harvested crops, saved part of the harvest for seeds, and exchanged seeds with neighbours. Every ritual in India involves seeds, the very symbol of life's renewal.

In 2004 two laws were proposed – a seed Act and a Patent Ordinance which could forever destroy the biodiversity of our seeds and crops, and rob farmers of all freedoms, establishing a seed dictatorship.

Eighty per cent of all seed in India was saved by farmers. Farmers indigenous varieties are the basis of our ecological and food security. Coastal farmers have evolved salt resistant varieties. Bihar and Bengal farmers have evolved flood resistant varieties, farmers of Rajasthan and the semi-arid Deccan have evolved drought resistant varieties, Himalayan farmers have evolved frost resistant varieties. Pulses, millets, oilseeds, rices, wheats, vegetables provide the diverse basis of our health and nutrition security. This is the sector being targeted by the Seed Act. These seeds are indigenous farmers varieties of diverse crops – thousands of rices, hundreds of wheats, oilseeds such as linseed, sesame, groundnut, coconut, pulses including gahat, narrangi, rajma, urad, moong, masur, tur, vegetables and fruits. The Seed Act is designed to "enclose" the free economy of farmers seed varieties. Once farmers seed supply is destroyed through compulsory registration by making it illegal to plant unlicensed varieties, farmers are pushed into dependency on corporate monopoly of patented seed. The Seed Act is therefore the handmaiden of the Patent Amendment Acts which have introduced patents on seed.

New IPR laws are creating monopolies over seeds and plant genetic resources. Seed saving and seed exchange, basic freedoms of farmers, are being redefined. There are many examples of how Seed Acts in various countries and the introduction of IPRs prevent farmers from engaging in their own seed production. Josef Albrecht, an organic farmer in Germany, was not satisfied with the commercially available seed. He worked and developed his own ecological varieties of wheat. Ten other organic farmers from neighbouring villages took his wheat seeds. Albrecht was fined by his government because he traded in uncertified seed. He has challenged the penalty and the Seed Act because he feels restricted in freely exercising his occupation as an organic farmer by this law.

In Scotland, there were a large number of farmers who grew seed potato and sold seed potato to other farmers. They could, until the early 1990s, freely sell the reproductive material to other seed potato growers, to merchants, or to farmers. In the 1990s, holders of plant breeders' rights started to issue notices to potato growers through the British Society of Plant Breeders and made selling of seed potato by farmers to other farmers illegal. Seed potato growers had to grow varieties under contract to the seed industry, which specified the price at which the contracting company would take back the crop and barred growers from selling the crop to anyone. Soon, the companies started to reduce the acreage and prices. In 1994, seed potato bought from Scottish farmers for £140 was sold for more than double that price to English farmers, whilst the two sets of farmers were prevented from dealing directly with each other. Seed potato growers signed a petition complaining about the stranglehold of a few companies acting as a 'cartel'. They also started to sell non-certified seed directly to English farmers. The seed industry claimed they were losing £4 million in seed sales through the direct sale of uncertified seed potato between farmers. In February 1995, the British Society for Plant Breeders decided to proceed with a high profile court case against a farmer from Aberdeenshire. The farmer was forced to pay £30,000 as compensation to cover royalties lost to the seed industry by direct farmer-to-farmer exchange. Existing United Kingdom and European Union laws thus prevent farmers from exchanging uncertified seed as well as protected varieties (Vandana Shiva, Patents, Myths and Reality, Penguin India, New Delhi, p.73)

In the US as well, farmer-to-farmer exchange has been made illegal. Dennis and Becky Winterboer were farmers owning a 500-acre farm in Iowa. Since 1987, the Winterboers had derived a sizeable portion of their income from 'brown bagging' sales of their crops to other farmers to use as seed. A 'brown bag' sale occurs when a farmer plants seeds in his own field and then sells the harvest as seed to other farmers. Asgrow (a commercial company now owned by Monsanto which has plant variety protection for its soybean seeds) filed suit against the Winterboers on the grounds that its property rights were being violated. The Winterboers argued that they had acted within the law since according to the Plant Variety Act farmers had the right to sell seed, provided both the farmer and seller were farmers. Subsequently, in 1994, the Plant Variety Act was amended, and the farmers' privilege to save and exchange seed was amended, establishing absolute monopoly of the seed industry by making farmer-to-farmer exchange and sales illegal. (Ref : Op Cit, p.74)

Similar laws are being introduced in India. The entire country is being taken for a ride with the introduction of the Seed Act 2004 on grounds that the Act is needed to guarantee seed quality. However, the Seed Act 1966 already performs the function of seed testing and seed certification. Twenty labs have been declared as seed testing labs under the 1966 Act in different States. Nine seed corporations have been identified as certification agencies.

Under pressure from World Bank the Seed Policy of 1988 started to dismantle our robust public sector seed supply system, which accounted for 20% of the seeds farmers grow. Eighty per cent of the seed prior to globalisation was the farmers' own varieties, which have been saved, exchanged and reproduced freely and have guaranteed our food security.

In Vidarbha farmers called Cotton White Gold. In 1972 a farmer could buy 15 grams of gold with what he/she earned from producing one quintal of cotton. Farmers made Rs.340 per quintal and gold went at Rs.220 for ten grams. By the 1990s, that trend had been reversed.

By 2005, one needed to sell five quintals of cotton to buy 15 grams of gold. By early 2008, gold was at Rs. 12125 for 10 grams, cotton at Rs.2000 a quintal. One now needed to sell nine quintals of cotton to buy 15 grams of gold The living standards of farmers in cotton-growing regions like Vidarbha fell sharply.

As India embraced neo-liberal globalism on one hand, cotton-growers were locked into the volatility of global prices, on the other, input costs were exploding. Local seed cost was around Rs.9 a kilogram in 1991. By 2004, commercial seed had taken over and could cost as much as Rs.1,650 to Rs.1,800 for just 450 grams, State intervention later brought the price down to half that. But the damage had been done. And even today's price of Rs.650-850 for less than half a kg is still many times higher than Rs.9 a kg. In Maharashtra, the State actively promoted the costly Bt seed, its own agency being a distributor. Huge sums also went to promoting it by using film stars as "brand ambassadors." (Sainath P., "It's the policy, stupid not implementation, Part-II, http://www.indiatogether.org)

Other inputs, fertilizer, pesticide, utilities like water and electricity, all saw a big rise in costs from the mid to late 1990s. Cotton covers about 5 per cent of cultivable area in India but accounts for 55 per cent of all pesticides used. That is in itself a huge problem with alarming long-term consequences for agriculture, environment and health as a whole. With the massive spread of these pesticides, it is no surprise that most farmers taking their lives swallowed chemical pesticides. Pesticides are so easy to access.

Successive Indian governments did nothing to stop the dumping of subsidized U.S. cotton in India. There are no duties on import of cotton today. India is the second biggest producer of what is one of the world's most widely traded commodities. Yet between 1997-98 and 2004-05, we imported 115 lakh bales. That is, over three times the number we did in the preceding 25 years.

Monsanto/Mahyco had given license to 60 companies. The license is available at initial payment of Rs. 5 million, but the license bars these companies from entering into agreements with any other technology provider. Giving a license or not is also the sole discretion of Monsanto. Infact Bt technology should be available to all those who are willing to pay a royalty of five percent royalty. Under international agreement, Monsanto/Mahyco can charge royalty of 20% for three years and five percent for three more years. The Rs. 5 million initial fee also places it outside the affordability bracket for many small companies (Sreelatha Menon, "Seed Firms, Experts Say Cotton Parallel should be Warning", February 5, 2010, Business Standard, New Delhi).

The farm sector is also seeing a huge squeeze on its income – the prices of inputs are rising faster than the output prices. The increasing corporatisation of inputs, as exemplified by the Monsanto-driven Bt-crops, exacerbates this squeeze further, and must be an issue of concern. Monsanto has reaped a bonanza from Bt cotton in India. The farmers were initially paying a technology fee component of Rs. 725 for a 450 gm packet of seed costing Rs. 1,600. If this had continued, this would have meant about Rs. 10 billion per year as direct transfer from Indian farmers to Monsanto. Even after state governments forced Monsanto to slash prices, Monsanto gets about Rs. 34 billion per year from Indian farmers (Purkayastha Purbir and Satyajit Rath, "Bt Brinjal : Need to Refocus the Debate", Volume XLIV, No. 20, May 15-21, 2010, Economic and Politcal Weekly, Mumbai).

Today there is no seed but Bt Cotton in the market.

That is why Navdanya has established community seed banks in the suicide belt of Vidharbha in Maharashtra. And farmers are now reclaiming their seed freedom and seed sovereignty,

2(c) Anti-Trust Cases Against Monsanto's Seed Monopoly

On June 26, 2006, the Andhra Pradesh Government filed a contempt petition before the Monopolies and Restrictive Trade Practices Commission (MRTPC) for not obeying the commission's order on 'trait value' of Bt cotton seed.

Monsanto enjoys a monopoly on production, supply and marking of Bt cotton seed in India. The firm operates through its subsidiary – Mahyco. From the last few years, the company has been charging a 'trait value' (price fixed for research and development on Bt cotton seed, which can resist local pests) at Rs. 1750 per pack of 450 grams of seed. The "trait value" is in fact royalty. However, since Monsanto introduced Bt Cotton before patents on GM seeds were allowed, it cannot claim a patent.

The MNC gets the seed for Rs. 300 per pack of 750 grams from the farmers who grow it under the company's supervision. The government has challenged the validity of the 'trait value' in the court and demanded its abolition. The government has also demanded Rs 4 billion from the company, which it collected from the farmers. The MRTPC directed Mahyco-Monsanto to reduce the 'trait value' to a reasonable extent. The MNC tried to approach the Supreme Court to stay the order of the MRTPC. But, the apex court refused to grant a stay.

Meanwhile, the Andhra Pradesh government had convened a meeting of the seven other states – Orissa, Karnataka, Maharashtra, Tamil Nadu, Madhya Pradesh, Punjab, Haryana. It was decided in the meeting to bring pressure on Monsanto to reduce the price of Bt cotton seed so the farmers are not over burdened by the exorbitant price.

The Andhra government's contention is that the high price of the Bt cotton seed is one of the reasons for distress among farmers. More than 25000 farmers committed suicide in the fifteen years in Andhra alone and most of them were cotton growers. The Andhra Pradesh government, in its petition, said that the company had deliberately ignored the MRTPC order and withheld the stocks and failed to supply the seed even after the onset of monsoon. The government told the commission that there were a large number of complaints from the farmers about the attitude of the seed suppliers including Monsanto about withholding stock in the market. The State government held meetings with the seed producers about their marketing plans and asked them not to charge the 'trait value' beyond Rs 750 per 450 gram pack.

The petition says that after the Supreme Court declined to stay the Commission Order on May 30, 2005 the company fixed the value of Bt cotton seed at Rs 880 per unit of 450 gram. This violates the commission's direction to the company to fix a reasonable 'trait value' on the lines of China. The act of the company in fixing the price of seed was violative of the commission order, the government said in its petition before the MRTPC. The government also asked the commission to initiate contempt proceedings against the company and its officials.

MRTPC ordered Monsanto to reduce its seed price.

The Andhra Pradesh Governemnt also passed the Andhra Pradesh Cotton Seeds (Regulation of supply, distribution, sale price) Act, 2007 to regulate the price of cotton seed.

Monsanto / Mahyco challenged the Act. Navdanya has intervened in the case.

3. Moratorium on Bt Brinjal

3 (a) Bt Brinjal was a test case for India's Seed Sovereignty, Food Sovereignty and Knowledge Sovereignty

In February 2010, the Minister of Environment of India, Jairam Ramesh, on the basis of public hearings held across the country ordered a moratorium on the commercial release of Bt Brinjal.

The approval of Bt Brinjal by the GEAC has exposed the unscientific basis on which genetically engineered crops are being commercialized and the regulatory chaos and corruption in Biosafety.

The admission by the Chair of the panel EC II on the Bt Brinjal Dr. Arjula Reddy, that the Agriculture Minister pressurized the panel to approve the Bt Brinjal is a symptom of the corruption that needs investigation.

The Bt Brinjal debate is not just about a vegetable. It is a test for our food sovereignty and our democracy. This is why it was so important to take it to the public through the series of public hearings that have been organized by the Ministry of Environment. The public hearings should be treated like a referendum on GMOs. This is vital for democracy in the most vital aspect of life – the food we eat.

The uncertainty of the technology is the reason that antibiotic resistance marker genes are used to separate the cells whose genome absorbed the foreign gene from those that do not. The Bt Brinjal uses a gene Cry 1 Ac to produce a toxin from a soil organism – Bacillus Thurengensis (BT) as well as two antibiotic resistance marker genes. The npt 11 gene confers resistance to the antibiotics kanamycin and neomycin. The aad gene confers resistance to antibiotic resistance marker genes is to separate the cells that absorbed the Bt Gene from those that did not.

To assess biosafety, safety tests need to assess the transgene – i.e the Bt Gene Cry 1Ac plus antibiotic resistance marker genes (npt 11+aad) plus the viral promoter (Ca MV3 35S) plus the vector (Agrobacterium).

However, the tests on biosafety of Bt Brinjal done by Monsanto / Mahyco and approved by GEAC have not tested Bt Brinjal at all. They have used the naturally occurring and safe microbial Bt This is a "don't look, don't see" policy.

The safety of microbial Bt sprays cannot be used as proof of safety of transgenic Bt Bt sprays are composed primarily of endotoxins in an inactive crystalline form. Bt crops on the other hand are genetically engineered to produce the Bt toxin, which is active without processing.

Genetically engineered Bt Brinjal can lead to genetic pollution and contamination. Here too, totally unscientific arguments have been used by the panel to deny the ecological risks of genetic pollution. The panel cannot make up its mind whether Brinjal is self-pollinated or cross pollinated.

Indian researchers have reported 2 to 48% out crossing in brinjal varieties in India".

The Mahyco results on cross pollination vary from 1.4% to 2.7% in 2002, and drop to .14% to .85% in the 2007 studies.

These unscientific claims go counter to the established science of plant breeding which has established 200 meters as the isolation distance for breeding foundation seed and 100 metres for breeding certified seed for Brinjal. Bees pollinate over larger distances.The former UK Minister for the Environment, Michael Meacher had to admit that bees, which may fly upto 9 kilometres (6 miles) in search of nectar, cannot be expected to observe a "no-fly-zone' A study by the National Pollen Research Unit in 1999 shows that wind can carry viable maize pollen hundreds of kilometers in 24 hours. Transgenic pollen was found 4.5 km (nearly 3 miles) from a field of GM oilseed rape in the Oxfordshire. This was at least 20 times over the limit set by the regulatory agencies.

This level of genetic pollution will destroy our organic farmers who with love and care produce pesticide free, GMO free vegetables for citizens. Instead of recognizing that approval for commercial cultivation of Bt Brinjal is a threat to organic growers, the panel carelessly and callously states that the responsibility of avoiding pollution lies with organic producers.

Why should our small organic growers have to bear the burden of avoiding contamination of their crops? Liability systems need to be evolved which make pollinators pay and make the company liable for economic damages. Until then, there should be a moratorium on Bt Brinjal.

During the moratorium, the Government needs to set up interdisciplinary biosafety assessment systems and inter-ministerial biosafety regulatory processes which should be independent of the biotechnology industry. It also needs to have a system of labeling of GMOs to respect the right of citizens to know what they are eating and make informed choices.

This is imperative to protect our Food Sovereignty and our Food Democracy.

3 (b) The Bt Brinjal Moratorium is a Science Based Decision

After the Minister of Environment announced the moratorium on Bt Brinjal, article after article in the media has denounced the decision, saying such decisions should be left to "scientists". The issue is however not science vs anti-science. It is biased science vs independent science. It is reductionist science vs systems science. The moratorium is science based because it took into account the best of science.

It is leading scientists who have called for caution and for full and independent assessment. Dr. Pushpa Bhargava, the leading scientist who established genetic engineering in India, has been the most vocal voice against Bt Brinjal. The moratorium is in fact a science based decision. The so called "scientists" speaking most vociferously for Bt Brinjal are in fact "technicians" who are using an outmoded reductionist science to develop GM crops for corporations like Monsanto / Mahyco.

Leaving biosafety decisions in their hands is unethical and risky for society. It is unethical because developers and promoters of a technology cannot decide if it is good for society or not. This is an example of conflict of interest. It is risky because they lack the scientific expertise needed for biosafety assessment. They are like makers of refrigerators who have no idea that the chlorofluorocarbons they use can make a hole in the ozone layer. They are like makers of cars who have no idea that the emissions of their cars pollute the atmosphere and destabilize the climate. Production expertise is not the same as impact expertise. Both to avoid conflict of interest and to avoid narrow minded risk assessment, decisions about GM food cannot be left to the technicians who are developing GM foods.

Genetic engineering is based on reductionist biology, the idea that living systems are machines, and you can change parts of the machine without impacting the organism. Reductionism was chosen as the preferred paradigm for economic and political control of the diversity in nature and society.

Genetic determinism and genetic reductionism go hand in hand. But to say that genes are primary is more ideology than science. Genes are not independent entities, but dependent parts of an entirety that gives them effect. All parts of the cell interact, and the combinations of genes are at least as important as their individual effects in the making of an organism.

More broadly, an organism cannot be treated simply as the product of a number of proteins, each produced by the corresponding gene. Genes have multiple effects, and most traits depend on multiple genes.

Yet, the linear and reductionist causality of genetic determinism is held onto, even though the very processes that make genetic engineering possible run counter to the concepts of "master molecules" and the "central dogma". As Roger Lewin has stressed "Restriction sites, promoters, operators, operons, and enhancers play their part. Not only does DNA make RNA, but RNA, aided by an enzyme suitably called reverse transcriptase, makes DNA".

Genetic engineering has epistemological and ethical implications not merely for the material conditions of our life, our health, and our environment. Health implications are built into the very techniques of genetic engineering.

Genetic engineering moves genes across species by using "vectors" – usually a mosaic recombination of natural genetic parasites from different sources, including viruses causing caners and other diseases in animals and plants that are tagged with one or more antibiotic resistant "marker" genes. Evidence accumulating over the past few years confirms the fear that these vectors constitute major sources of genetic pollution with drastic ecological and public health consequences. Vector mediated horizontal gene transfer and recombinations are found to be involved in generating new pandemic strains of bacterial pathogens.

Biotech technicians do not have either the scientific expertise of gene ecology or the scientific expertise in the multiple disciplines that are needed for the risk assessment of GMOs in the context of their impact on the environment and public health.

Real scientists know that mechanistic science of genetic reductionism is inaccurate and flawed. Deeper research has led to the emergent field of epigenetics. The prefix epi means "over and above". While genetic reductionism leads to the false assumption that genes control the traits of life, the new science of epigenetic control reveals that life is controlled by something above the genes. Environmental signals acting through membrane switches control gene activity. Environmentally derived signals activate membrane switches that send secondary signals into the cell nucleus, and within the nucleus the signals select gene blueprints and control the manufacturing of specific proteins. Epigenetic mechanisms can edit the read out of a gene so as to create over 30,000 different variations of proteins for the same gene blueprint. Epigenetic describes how gene activity and cellular expression are regulated by information from the environment, not by the internal matter of DNA.

The biotech mechanics do not function in the paradigm of epigenetics or gene ecology. They are trapped in the outmoded paradigm of genetic reductionism.

The limitation at a higher systems level is even more serious. Bt Brinjal is being offered as a pest control solution. A gene for producing a toxin is being put into the plant, along with antibiotic resistance markers and viral promoters. This is like using a JCB to make a hole in the wall of your house for hanging up a painting. Like the JCB will destroy the wall, the transgenic transformation will disrupt the metabolism and self regulatory processes of the organism. Genetic engineering is "high tech" like the JCB, but it is also crude tech for the sensitive task of maintaining the ecological fabric of agriculture to control pests. Pests are controlled through biodiversity, through organic practices which build resilience to pests and disease. In Navdanya we use no pesticides and have no pests. In Andhra Pradesh, a Government project for Non-Pesticide Management has covered 14 lakh acres.

The scientific alternative to the crude tech of putting toxic genes into our food is agro ecology. The International Assessment on Agricultural Science and Technology Development has recognized from a global survey of peer reviewed studies that agro ecology based systems outperform farming systems using genetic engineering.

Epigenetics and agro ecology are the sciences for the future. Reductionist biology is a primitive science of the past.

Our decisions about food and agriculture need to be based on the best of science, not the worst of science. They definitely should not be based on a crude technology parading the science.

Because we are what we eat, and food becomes our bodies, citizens must have a choice about what they eat. The democratization of science and decision making has become an imperative. All human beings

are knowing subjects and in a democracy people's knowledge and peoples knowledge and people's choices must count.

That is why the public hearings on Bt Brinjal were a democratic imperative.

Those who say our food choices must be left to biotech technicians are working against both science and democracy.

3 (c) Golden Rice : A Blind Approach to Blindness Prevention

While inaugurating a global conference on Leveraging Agriculture for Improving Nutrition and Health organised by the International Food Policy Research Institute (IFPRI) on 10th February, 2011 in New Delhi, the Prime Minister of India, Dr. Manmohan Singh made a case for genetically modified crops by supporting Golden Rice "I understand that research efforts have made it possible to bio-fortify some crops for better nutrition outcomes. Golden rice containing beta carotene provides the calories as well as nutritional supplements that take care of several diseases associated with Vit. A deficiency", he said (Ashok Sharma, http://www.mynews.in/News/)

Golden rice has been heralded as the miracle cure for malnutrition and hunger of which 800m members of the human community suffer.

Herbicide resistant and toxin producing genetically engineered plants can be objectionable because of their ecological and social costs. But who could possibly object to rice engineered to produce vitamin A, a deficiency found in nearly 3 million children, largely in the Third World?

As remarked by Mary Lou Guerinot, the author of the Commentary on Vit. A rice in Science,

"One can only hope that this application of plant genetic engineering to ameliorate human misery without regard to short term profit will restore this technology to political acceptability." (Mary Lou Guerinot, Journal Science, January 14, 2000, p.303)

Unfortunately, Vitamin A rice is a hoax, and will bring further dispute to plant genetic engineering where public relations exercises seem to have replaced science in promotion of untested, unproven and unnecessary technology.

The problem is that vit. A rice will not remove vit. A deficiency (VAD). It will seriously aggravate it. It is a technology that fails in its promise.

Currently, it is not even known how much vit. A the genetically engineered rice will produce. The goal is 33.3% micrograms/100g of rice. Even if this goal is reached after a few years, it will be totally ineffective in removing VAD.

Since the daily average requirement of vit. A is 750 micrograms of vit. A and 1 serving contains 30g of rice according to dry weight basis, vit. A rice would only provide 9.9 micrograms which is 1.32% of the required allowance. Even taking the 100g figure of daily consumption of rice used in the technology transfer paper would only provide 4.4% of the RDA.

In order to meet the full needs of 750 micrograms of vit.A from rice, an adult would have to consume 2 kg 272g of rice per day. This implies that one family member would consume the entire family ration of 10 kg. from the PDS in 4 days to meet vit.A needs through "Golden rice".

This is a recipe for creating hunger and malnutrition, not solving it.

Besides creating vit. A deficiency, vit. A rice will also create deficiency in other micronutrients and nutrients. Raw milled rice has a low content of Fat (0.5g/100g). Since fat is necessary for vit. A uptake, this will aggravate vit. A deficiency. It also has only 6.8g/100g of protein, which means less carrier molecules. It has only 0.7g/100g of iron, which plays a vital role in the conversion of Betacarotene (precursor of vit. A found in plant sources) to vit. A.

Superior Alternatives exist and are effective.

A far more efficient route to removing vit. A deficiency is biodiversity conservation and propagation of naturally vit. A rich plants in agriculture and diets. Table 6.12 Gives sources rich in vit. A used commonly in Indian foods.

Sources rich in vit. A used commonly in Indian foods.

Source	**Hindi name**	**Content (microgram/100g)**
Amaranth leaves	Chauli saag	266-1,166
Coriander leaves	Dhania	1,166-1,333
Cabbage	Bandh gobi	217
Curry leave	Curry patta	1,333
Drumstick leaves	Saijan patta	1,283
Fenugreek leaves	Methi-ka-saag	450
Radish leaves	Mooli-ka-saag	750
Mint	Pudhina	300
Spinach	Palak saag	600
Carrot	Gajar	217-434
Pumpkin (yellow)	Kaddu	100-120

Mango (ripe)	Aam	500
Jackfruit	Kathal	54
Orange	Santra	35
Tomato (ripe)	Tamatar	32
Milk (cow, buffalo)	Doodh	50-60
Butter	Makkhan	720-1,200
Egg (hen)	Anda	300-400
Liver (Goat, sheep)	Kalegi	6,600–10,000
Cod liver oil		10,000–100,000

Inspite of the diversity of plants evolved and bred for their rich vit. A content, a report of the Major Science Academies of the World – Royal Society, U.K., National Academy of Sciences of the USA, The Third World Academy of Science, Indian National Science Academy, Mexican Academy of Sciences, Chinese Academy of Sciences, Brazilian Academy of Sciences – on Transgenic Plants and World Agriculture has stated, (Ref : Transgenic Plants and World Agriculture" Report by a Working Group Representing Seven Science Academies Released July 11, 2000)

"Vit. A deficiency causes half a million children to become partially or totally blind each year. Traditional breeding methods have been unsuccessful in producing crops containing a high vit. A concentration and most national authorities rely on expensive and complicated supplementation programs to address the problem. Researchers have introduced three new genes into rice, two from daffodils and one from a microorganism. The transgenic rice exhibits an increased production of betacarotene as a precursor to vit. A and the seed in yellow in colour. Such yellow, or golden rice, may be a useful tool to help treat the problem of vit. A deficiency in young children living in the tropics."

It appears as if the world's top scientists suffer a more severe form of blindness than children in poor countries. The statement that "traditional breeding has been unsuccessful in producing crops high in vit. A" is not true given the diversity of plants and crops that Third World farmers, especially women have bred and used which are rich sources of vit. A such as coriander, amaranth, carrot, pumpkin, mango, jackfruit.

It is also untrue that vit. A rice will lead to increased production of betacarotene. Even if the target of 33.3 microgram of vit. A in 100g of rice is achieved, it will be only 2.8% of betacarotene we can obtain from amaranth leaves 2.4% of betacarotene obtained from coriander leaves, curry leaves and drumstick leaves.

Even the World Bank has admitted that rediscovering and use of local plants and conservation of vit. A rich green leafy vegetables and fruits have dramatically reduced VAD threatened children over the past

20 years in very cheap and efficient ways. Women in Bengal use more than 200 varieties of field greens. Over a 3 million people have benefited greatly from a food based project for removing VAD by increasing vit. A availability through home gardens. The higher the diversity crops the better the uptake of pro-vitamin A.

The reason there is vit. A deficiency in India in spite of the rich biodiversity base and indigenous knowledge base in India is because the Green Revolution technologies wiped out biodiversity by converting mixed cropping systems to monocultures of wheat and rice and by spreading the use of herbicides which destroy field greens.

In spite of effective and proven alternatives, a technology transfer agreement has been signed between the Swiss Government and the Government of India for the transfer of genetically engineered vit. A rice to India. The ICAR, ICMR, ICDS, USAIUD, UNICEF, WHO have been identified as potential partners. The breeding and transformation is to be carried out at Tamil Nadu Agricultural University, Coimbatore, Central Rice Research Institute, Cuttack and Punjab Agricultural University, Ludhiana and University of Delhi, South Campus.

The Indian varieties in which the vit. A traits are expected to be engineered have been identified as IR 64, Pusa Basmati, PR 114 and ASD 16.

Dr. M.S. Swaminathan has been identified as "God father" to ensuring public acceptance of genetically engineered rice. DBT & ICAR are also potential partners for guaranteeing public acceptance and steady progress of the project.

Transferring an Illusion to India

The first step in the technology transfer of vit. A rice requires a need assessment and an assessment of technology availability. Our assessment shows that vit. A rice fails to pass the need test.

The technology availability issue is related to whether the various elements and methods used for the construction of transgenic crop plants are covered by intellectual property rights. Licenses for these rights need to be obtained before a product can be commercialised. The Cornell based ISAAA (International Service for the Acquisition of Agri-biotech Application) has been identified as the partner for ensuring technology availability by ensuring technology availability by having material transfer agreements signed between the representative authority of the ICAR and the "owners" of the technology, Prof. I. Potrykus and Prof. P. Beyer.

In addition, Novartis and Kerin Breweries have patents on the genes used as constructs for the vit. A rice.

At a public hearing on Biotechnology at U.S. Congress on 29th June 2000, Astra-Zeneca stated they would be giving away royalty free licenses for the development of "Golden rice".

At a workshop organised by the M. S. Swaminathan Research Foundation, Dr. Barry of Monsanto's Rice Genome initiative announced that it will provide royalty-free licenses for all its technologies that can help the further development of "golden rice".

Hence these gene giants Novartis, Astra-Zeneca and Monsanto are claiming exclusive ownership to the basic patents related to rice research. Further, neither Monsanto nor Astra – Zeneca said they will give up their patents on rice – they are merely giving royalty free licenses to public sector scientists for development of "golden rice". This is an arrangement for a public subsidy to corporate giants for R&D since they do not have the expertise or experience with rice breeding which public institutions have. Not giving up the patents, but merely giving royalty free licenses implies that the corporations like Monsanto would ultimately like to collect royalties from farmers for rice varieties developed by public sector research systems. Monsanto has stated that it expects long term gains from these IPR arrangements, which implies markets in rice as "intellectual property" which cannot be saved or exchanged for seed. The real test for Monsanto would be its declaration of giving up any patent claims to rice now and in the future and joining the call to remove plants and biodiversity out of TRIPS. Failing such an undertaking by Monsanto the announcement of Monsanto giving royalty free licenses for development of vit. A rice can only be taken as an attempt to establish monopoly over rice production, and reduce rice farmers of India into bio-serfs.

While the complicated technology transfer package of "Golden Rice" will not solve vit. A problems in India, it is a very effective strategy for corporate take over of rice production, using the public sector as a Trojan horse.

3 (d) GM Potato Hoax

First it was the "Golden Rice Hoax" to sell genetically engineered foods as a solution to hunger and poverty and blindness due to Vitamin A deficiency. We showed that greens and fruits and vegetables that could be grown in every backyard provided hundreds of times more Vitamin A than "golden rice". Now we are being sold a "Protein Potato" hoax as part of anti-hunger plan formulated in collaboration with government institutes, scientists, industry and charities. The potato is claimed to contain a third more protein than normal, including essential high-quality nutrients, and has been created by adding a gene from the protein-rich amaranth plant. Scientists at the National Institute of Plant Genome Research in New Delhi, led by Subhra Chakravorty had increased their claim to 60% more protein. (Ref : Genetically Modified Potato Packs a Protein Punch, **http://www.xperedom.com/charity-news-article-251**).

On June 11, 2003, BBC reported Dr. Manju Sharma, then Head of the Department of Biotechnology (DBT), saying that "the GM potato… reduce the problem of malnutrition in the country". She planed to incorporate it into the government's free midday meal programme in schools. (Pallab Ghosh, India to approve GM Potato, BBC, 11 June, 2003, **http://new.bbc.co.uk/.2/hi/science/nature/2980338.com**).

However, inserting genetically engineering genes for proteins from amaranth into potatoes, and promoting potato as a staple for mid-day meals for children is a decision not to promote amaranth and pulses (the most important source of protein in the Indian diet). Amaranth contains 14.7 gms of protein per 100 gm of grain, compared to 6.8 gm/100gm in milled rice and 11 gm/100gm in wheat flour and 1.6 gm/100 gm in potato.

When compared to bringing nutrition through grains like amaranth, genetically engineered potatoes will in fact create malnutrition because it will deny to vulnerable children the other nutrients available in grain amaranth and not available in potato. The table below gives the comparative nutrition from amaranth and potatoes.

- Iron Amaranth (11mg/ 100gm)
- Potatoes (0.7mg/ 100gm)
- Nutrition in GM Potatoes with Amaranth
- protein genes compared to amaranth (-10.3 mg/100gm)
- Calcium Amaranth (510mg/100gm)
- Potatoes (10mg/ 100gm)
- Nutrition in GM Potatoes with Amaranth
- protein genes compared to amaranth (- 500mg/100gm)
- Protein Amaranth (14.7gm /100gm)
- Potatoes (1.6gm/100gm)
- Nutrition in GM Potatoes with Amaranth
- protein genes compared to amaranth (Assume same)

Thus genetically engineered potato will in fact spread iron deficiency and calcium deficiency in children. The ancient people of the Andes treated amaranth as sacred. In India it is called "Ramdana" or God's own grain. The root word "amara", in both Greek and Sanskrit means eternal or deathless. A much smarter option is to spread the cultivation and use of amazing grains like amaranth.

In any case, amaranth is not the only source of protein in India's rich biodiversity and cuisine. Our "dals", pulses, legumes that are a staple with rice as dal-chawal and with wheat as dal-roti are also very rich in protein.
The consumption of dals & pulses provides much higher levels of proteins than GM potatoes can.

The poor Indian children would get full balanced diet in dals, pulses and amaranth instead of getting malnourished by consuming "protein rich" GM potatoes.

Proteins in Different Pulses - Pulses Protein per 100 gm
Bengal gram (whole) 17.1 gm
Horse gram 22.0 gm
Bengal gram roasted 22.5 gm
Lentil 25.1 gm
Black gram 24.0 gm

Moth bean 23.6 gm
Cow pea 24.1 gm
Peas dry 19.7 gm
Field Bean 24.9 gm
Rajma 22.9 gm
Green gram dal 24.5 gm
Redgram 22.3 gm

4 (a) The Great Seed Robbery

The seed, the source of life, the emobodiment of our biological and cultural diversity, the link between the past and the future of evolution, the common property of past, present and future generations of farming communities who have been seed breeders is today being stolen from the farmers and being sold back to us as "propreity" seed, owned by corporations like Monsanto.

Under pressure of the Prime Minister's Office (which in turn is under the pressure of the White House because of signing the U.S – India Agriculture Agreement) the States are signing MOUs (Memoranda of Understandings) with seed corporations to privatise our rich and diverse genetic heritage. The Government of Rajasthan has signed seven MOUs with Monsanto, Advanta, DCM-Sriram, Kanchan Jyoti Agro Industries, PHI Seeds Pvt. Ltd, Krishidhan Seeds and J.K. Agri Genetics.

While what is being undertaken is a great seed robbery under the supervision of the State, it is being called PPP - Private Public Partnership.

The MOU with Monsanto focuses on Maize, Cotton, and vegetables (hot pepper, tomato, cabbage, cucumber, cauliflower, water melon). Monsanto has bought up Seminis, the world's largest seed company. Monsanto controls the cotton seed market in India and globally. Monsanto controls 97% of the worldwide Maize market, and 63.5% of the GM cotton market. And Dupont has had to initiate anti-trust investigations in U.S because of Monsanto's growing seed monopoly. Thus the MOU will establish a monopoly over seed supply.

There is nothing in the MOUs for regulating seed prices and prevent seed monopolies.

Farmers development would consist of recognition of their rights, and their participation in conservation and improvement of plant genetic resources through participatory breeding programmes. Farmers Development is based on the foundation of their seed sovereignty.

The commodified seed is ecologically incomplete and ruptured at two levels: First, it does not reproduce itself, while by definition, seed is a regenerative resource. Genetic resources are thus, through technology, transformed from a renewable into a nonrenewable resource. Second, it does not produce by itself; it needs the help of other purchased inputs. And, as the seed and chemical companies merge, the dependence of inputs will increase. High seed costs are responsible for 50% – 70% of farmers debt which has led to farmers suicides.

The failure of hybrid sunflower in Karnataka and hybrid Maize in Bihar has cost poor farmers hundreds of crores in losses. There are no liability clauses in the MOUs to ensure farmers rights and protection from seed failure.

The seeds that will be used for essentially derived varieties by corporations like Monsanto are originally farmers varieties, and there is law to protect farmers rights "The Farmers Rights and Plant Genetic Resources Act", nothing in the MOUs acknowledges, protects or guarantees farmers rights. It is therefore violative of the Farmers Rights Act.

On the contrary, the MOUs are one sided and biased in favour of corporate intellectual property rights. The Monsanto MOU states :

> *"Monsanto's proprietary tools, techniques, technology, knowhow and intellectual property rights with respect to the crops shall remain the property of Monsanto although utilized in any of the activities outlined as part of the MOU."*

Rajasthan is an ecologically fragile area. Rajasthan farmers are already vulnerable. It is a crime to increase their vulnerability by allowing corporations to steal their genetic wealth and then sell them patented, genetically engineered ill adapted seeds. We must defend seeds as our commons. We must protect the seeds of life from the seeds of suicide.

Farmers breed for resilience and nutrition. Industrial breeding responds to intensive chemical inputs, intensive water inputs so seed companies can increase profits. The future of the seed, the future of the food, the future of farmers lies in conservation of biodiversity of our seed. Contrary to the myth that we need to hand over our seed supply to corporations to increase food production, farmers varieities when used in agro-ecological systems have the potential to double food production in 10 years according to the U.N.

Navdanya's research also shows that biodiversity based ecological agriculture produces more food than monocultures.

Hybrids and GMOs produce less nutrition per acre and are vulnerable to both climate change and pests and disease. Replacing agro-biodiversity with hybrid and GM crops is a recipe for food insecurity. The MOUs will facilitate the biopiracy of Rajasthan's rich biodiversity of drought resilient crops which become more valuable in times of climate change as Navdanya's report "The Biopiracy of Climate Resilient Crops"shows. By failing to put any clauses for respecting the Biodiversity Act and the Farmers Rights Act to prevent biopiracy, the MOUs in effect promote biopiracy and legalize the great seed robbery.

The private companies seed distribution will be based on "seed supply and distribution arrangements involving leverage of extensive government – owned network". Selling hybrids and then GMOs is

being subsidized by using public land for "Technology demonstration farms to showcase products technology and agronomic practices on land made available by the Government of Rajasthan".

Besides the handing over of seed and land, "Monsanto will be helped in the establishment of infrastructure towards the fulfillment of the collaboration objectives specified above through access to relevant capital subsidy and other schemes of the Government of Rajasthan".

While public resources will be freely given away to Monsanto as a subsidy, Monsanto's IPR monopolies will be protected. This is an MOU for "Monsanto takes all, the public system gives all".

It is clearly an MOU for privatization of our seed and genetic wealth, our knowledge and a violation of farmers rights. The seed supplies that the agriculture universities are handing over to Monsanto are not the property of the state, nor of Monsanto. They are the common property of farming communities.

The Indian public has just won the battle to include citizens in drafting the Lokpal Bill. It is time to stop pushing undemocratically and secretively drafted laws and MOUs like the Rajasthan Seed MOUs, the Seed Bill 2004 and the Biotechnology Regulatory Authority Act of India 2009 under corporate influence. These laws affect citizens, and citizens must be involved. Citizens participation in shaping laws and policies is real democracy.

Seed sovereignty is the foundation of food sovereignty. Seed freedom is the foundation of food freedom.

The great seed robbery threatens both. That is why it must be stopped.

4 (b) Hybrid Corn : The First Step for GMO Corn

Across India, Monsanto is introducing hybrid corn as a first step in creating seed dependency and introducing GMOs. Monsanto has been caught undertaking illegal GM corn trials in Bihar and Karnataka. According to India's Biosafety Laws, States must approve trials. Monsanto had not sought any such approval. The Chief Minister of Bihar, Nitesh Kumar, had to write to the Environment Minster to stop the trials.

Monsanto's GM corn has both Bt and Round Up Resistant Genes. (Ref : Down to Earth, "Maize Maine", August 1 – 15, 2011). Monsanto is entering into private-public-partnership (PPP's) with states to introduce hybrid maize, especially in biodiversity rich, seed sovereign tribal regions. Most of the corn goes to the poultry industry as feed, or to the starch industry only 25% corn is used for human consumption. The push for hybrid corn has displaced 1.65 million ha of other crops over the past decade. Farmers get a Rs. 5000/acre subsidy for inputs in Andhra Pradesh when they shift to hybrid maize.

In Gujarat, Monsanto's hybrid maize is being bought and distributed by the Tribal Development Department (TDD).

In Rajasthan, Monsanto has introduced Operation Golden Rays to introduce its hybrid maize (Monsanto's DKC 2074). The seeds are initially introduced free. The Government buys seeds from Monsanto with public money and distributes them free. In Rajasthan, of the Rs. 1 billion annual state budge of the National Agriculture Programme (Rastriya Krishi Vikas Yojana) meant to introduce the 2nd Green Revolution, Rs. 650 million has been spent to buy Monsanto's hybrid corn seeds.

The process through which Monsanto destroys seed sovereignty and establishes a seed monopoly is based on corrupting Government policy, destroying public system research and seed breeding, redirecting public money to create its market for non-renewable seed, beginning with hybrids and later introducing GMOs, transforming the seed and knowledge commons into its "intellectual property", and after having enclosed the commons and destroyed alternatives, establishing a monopoly on the seed supply. It is using public resources to destroy the public good and enclose the commons.

5. Patents and Biopiracy

Patents are at the heart of Monsanto's seed monopoly. After the WTO agreement was signed, a Monsanto representative said that Monsanto had been the "patient, diagnostician and physician" in drafting the Trade Related Intellectual Property Rights Agreement which forced countries to introduce patents on life and patents on seed. Beginning with GMOs, Monsanto is now patenting non-GM crops. In many cases, such patents are based in biopiracy.

5 (a) Biopiracy of Indigenous Wheat from India

Monsanto's patent on the Indian variety of wheat "Nap Hal". This was the third consecutive victory on the IPR front after Neem and Basmati, making it the third consecutive victory. This was made possible under the Campaign against Patent on Life as well as against Biopiracy respectively. MONSANTO, the biggest seed corporation, was assigned a patent (EP 0445929 B1) on wheat on 21 May 2003 by the European Patent Office in Munich under the simple title "plants". On January 27th 2004 Research Foundation for Science Technology and Ecology (RFSTE) along with Greenpeace and Bharat Krishak Samaj (BKS) filed a petition at the European Patent Office (EPO), Munich, challenging the patent rights given to Monsanto on Indian Landrace of wheat, Nap Hal. The patent was revoked in October 2004 and it once again established the fact that the patents on biodiversity, indigenous knowledge and resources are based on biopiracy and there is an urgent need to ban all patents on life and living organisms including biodiversity, genes and cell lines.

5 (b) Biopiracy of Brinjal Varieties for Bt Brinjal

The gene in Bt Brinjal has been licensed by Monsanto to Mahyco. Monsanto Mahyco has used six local brinjal (eggplant) varieties to develop Bt Brinjal. Since the Biodiversity Act of India requires approval for accessing indigenous biodiversity, the State Biodiversity Board of Karnataka, complained to the National Biodiversity Authority on 28th May 2011. The biopiracy of Brinja was challenged by the Environment Support Group of Bangalore before the Karnataka Biodiversity Board on February 15, 2010. Monsanto is also accessing native onion varieties to develop its proprietary hybrids. The company is going to pay Rs. 1 million to the Indian Institute of Horticulture Research for 25 gms each

of Male Sterile (A line) and Maintenance (B line) of MS 48 and MS 65 as one time license fee. Is this a just price? (Dinesh Sharma, Save our Onions from Seed Predators, India Today, August 11, 2011).

On August 12th, 2011, the National Biodiversity Authority announced that it would sue Monsanto for Biopiracy of Brinjal. The decision of the NBA reads "A background note besides legal opinion on Bt brinjal on the alleged violation by the M/s. Mahyco/M/s Monsanto, and their collaborators for accessing and using the local brinjal varieties for development of Bt brinjal with out prior approval of the competent authorities was discussed and it was decided that the NBA may proceed legally against M/s. Mahyco/ M/s Monsanto, and all others concerned to take the issue to its logical conclusion." (Emphasis supplied) (http://www.esgindia.org/campaigns/brinjal/press/national-biodiversity-authority-prosecut.html)

5 (c) Biopiracy of Melons

In May, 2011, Monsanto got a patent (EP 1 962578) on conventionally bred melons from the European Patent Office. Monsanto has used the natural resistance in Indian melons to certain plant viruses such as the yellow stunting disorder virus (CYSDV). Using conventional breeding, this resistance has now been introduced into other melons. While this is a biopriacy of a trait evolved by Indian farmers, Monsanto has patented the plant, all parts of the plant such as the seed and the melon fruit as its "invention".

The virus resistant melons were developed by the Dutch Company DeRinter and designated as P1 313970. Monsanto acquired the seed company in 2008, and patented the melon.

The Coalition "No Patents on Seed" have started a campaign to exclude breeding material, plants and animals, and foods derived thereof from patentability (www.no-patents-on-seed.org).

5 (d) Biopiracy of Climate Resilient Crops

Industrial globalised agriculture is heavily implicated in climate change. It contributes to the three major greenhouse gases – carbon dioxide from the use of fossil fuels, nitrogen oxide from the use of chemical fertilizers and methane from factory farming. According to the Intergovernmental Panel on Climate change (IPCC), atmospheric concentration of CO2 has increased from a pre-industrial concentration of about 280 parts per million to 379 parts per million in 2005. The global atmospheric concentration of CH_4 has increased from pre-industrial concentration of 715 parts per billion to 1774 parts per billion in 2005. The global atmospheric concentration of N_2O, largely due to use of chemical fertilizers in agriculture, increased from about 270 parts per billion to 319 parts per billion in 2005.

Industrial agriculture is also more vulnerable to climate change which is intensifying droughts and floods. Monocultures lead to more frequent crop failure when rainfall does not come in time, or is too much or too little. Chemically fertilized soils have no capacity to withstand a drought. And cyclones and hurricanes make a food system dependent on long distance transport highly vulnerable to disruption.

Genetic engineering is embedded in an industrial model of agriculture based on fossil fuels. It is falsely being offered as a magic bullet for dealing with climate change.

Monsanto claims that Genetically Modified Organisms are a cure for both food insecurity and climate change and has been putting the following advertisement across the world in recent months.

"9 billion people to feed.
A changing climate
Now what?
Producing more
Conserving more
Improving farmers lives
That's sustainable agriculture
And that's what Monsanto is all about."

All the claims this advertisement makes are false.

GM crops do not produce more. While Monsanto claims its GMO Bt cotton gives 1500 kg/acre, the average is 300 – 400 Kg/acre.

The claim to increased yield is false because yield, like climate resilience is a multi-genetic trait. Introducing toxins into a plant through herbicide resistance or Bt Toxin increases the "yield" of toxins, not of food or nutrition.

Drought tolerance is a polygenetic trait. It is therefore scientifically flawed to talk of "isolating a gene for drought tolerance". Genetic engineering tools are so far only able to transfer single gene traits. That is why in twenty years only two single gene traits for herbicide resistance and Bt toxin have been commercialized through genetic engineering.

Navdanya's recent report "Biopiracy of Climate Resilient Crops : Gene Giants are Stealing farmers innovation of drought resistant, flood resistant and salt resistant varieties" shows that farmers have bred corps that are resistant to climate extremes. And it is these traits which are the result of millennia of farmers breeding which are now being patented and pirated by the genetic engineering industry. Using farmers varieties as "genetic material", the biotechnology industry is playing genetic roulette to gamble on which gene complexes are responsible for which trait. This is not done through genetic engineering; it is done through software programs like athelete. As the ETC report states,

> *"Athlete uses vast amounts of available genomic data (mostly public) to rapidly reach a reliable limited list of candidate key genes with high relevance to a target trait of choice. Allegorically, the Athlete platform could be viewed as a 'machine' that is able to choose 50 – 100 lottery tickets from amongst hundreds of thousands of tickets, with the high likelihood that the winning ticket will be included among them".*

Breeding is being replaced by gambling, innovation is giving way to biopiracy, and science is being substituted by propaganda and resource grab. This cannot be the basis of food security in times of climate vulnerability.

While genetic engineering is a false solution, over the past 20 years, we have built Navdanya, India's biodiversity and organic farming movement. We are increasingly realizing there is a convergence between objectives of conservation of biodiversity, reduction of climate change impact and alleviation of poverty. Biodiverse, local, organic systems produce more food and higher farm incomes while they also reduce water use and risks of crop failure due to climate change.

Biodiversity offers resilience to recover from climate disasters. After the Orissa Super Cyclone of 1998, and the Tsunami of 2004, Navdanya distributed seeds of saline resistant rice varieties as "Seeds of Hope" to rejuvenate agriculture in lands reentered saline by the sea. We are now creating seed banks of drought resistant, flood resistant and saline resistant seed varieties to respond to climate extremities.

Climate resilient traits are not "inventions" of corporations. They have been evolved by nature and farmers. Patents on climate resilient crops are the latest example of biopiracy.

6. Dismantling Biosafety Regulation

Developers cannot be Regulators

The Biotechnology Regulatory Authority of India Bill 2011 (A proposal for deregulating GMOs)

Soon after a moratorium was put on Bt Brinjal, the Government came up with a new law.

The proposed Biotechnology Regulatory Authority Bill of India, 2011 BRAI) which is a new version of the older BRAI, 2009 and the National Biotechnology Regulatory Bill, 2008, is a recipe for deepening the regulatory chaos as well as deepening the crisis created by conflict of interest issues related to issues of genetic engineering. It is a law to subvert the existing Biosafety Regulation under the EPA, and deregulate GMOs.

The conflict of interest issues had become a major concern because the panel which approved the Bt Brinjal included some of the scientists involved in its development. That is why the public hearings were organized by the Ministry of Environment. As the Minister of Environment observed in his statement justifying the moratorium "while there may be a debate on the nature and number of tests that need to be carried out for establishing human safety, it is incontrovertible that the tests have been carried out by the Bt Brinjal developers themselves and not in any independent lab. This does raise legitimate doubts on the reliability of the tests."

The proposed BRAI is an attempt to take the conflict of interest to the structural level by making the department and Ministry that promotes biotechnology, in charge of the regulation of Biosafety. This is equivalent to asking the wolf to protect the sheep. For this reason alone, Parliament should reject the Bill to set up BRAI.

The BRAI will also deepen the regulatory chaos. In response to a case we had filed in the Supreme Court on the safety of GM crops, the Government's response was that the Food Safety and Standards Act, 2006 would address the lacunae in Biosafety Regulation. We now have another proposed Authority. And this is in addition to the existing Biosafety Law under the Environmental Protection Act 1986 (EPA) titled "The Rules for the Manufacture, Use / Import / Export and storage of hazardous micro-organisms / genetically engineered organisms or cells", 1989. The substantial parts of what the BRAI will cover are already covered by the EPA rules. These include the regulation of –

a) Any genetically engineered plant, animal, microorganism, virus or other animate organism that may have application in agriculture, fisheries (including aquaculture) forestry and food production
b) Any genetically engineered plant, animal, microorganism, virus or other animate organism used as food
c) Any animal clones that may have application in agriculture, fisheries or food production

It also includes DNA vaccines, transgenic blood, products of synthetic biology etc.

The proposed BRAI is in total denial of the existing Law. The proposed Law pretends we do not have a Law under the EPA. In the opening paragraph of the draft Bill it is stated that the Bill is drafted to implement the Cartagena Protocol on Biosafety to the Convention on Biological Diversity.

Firstly, India had a Biosafety Law put in place in 1989, fourteen years before the Cartagena Protocol came into force. That is why we did not need to create a new Law to implement the Biosafety Protocol. The BRAI is an attempt to dismantle the 1989 Law, and replace it with a Law for fast track promotion of GMOs.

Secondly, the Environment Ministry is the nodal Ministry for the Convention on Biological Diversity and the Cartagena Protocol. Even if we did not have a Biosafety Law under the EPA, which we do, it would be the Ministry of Environment that would be the responsible Ministry to implement International Law. The Department of Biotechnology and the Ministry of Science and Technology cannot usurp this role.

BRAI is the naked attempt of the biotechnology industry to shift GMO regulation to the Biotechnology Department in addition to promoting biotechnology. Since 1997-98, when Monsanto first brought in Bt Cotton seeds illegally to the country, it used the Department of Biotechnology, and the RCGM to cover up the illegal activities of the Biotechnology industry. Its powers were to be restricted to framing guidelines for good lab practices. It has overstepped its powers and used guidelines to undermine clauses of the 1989 EPA Law. When we filed a case in the Supreme Court in

1998 to stop Monsanto's illegal introduction of Bt Cotton seeds, it is the DBT/RCGM which gave approval, even though all deliberate release of GMOs is to be approved by GEAC. DBT / RCGM arbitrarily decided to call field trials contained experiments, even though GM crops planted in fields are a deliberate release. DBT has undermined science to rush GMOs to the market. Its track record shows that it cannot be trusted with Biosafety issues. The DBT has been trying to erode the Biosafety structures since 1997-98. Now it is going all the way to hijack and usurp the work of the Environment Ministry and to illegally undermine the 1989 EPA Law, through the proposed BRAI.

The 1989 Biosafety Law is an excellent science based legislation. What needs improvement is its implementation, and the working of the GEAC. The Minister of Environment has already announced that the GEAC would become the Genetic Engineering Assessment Committee and not just be a Genetic Engineering Approval Committee.

The Moratorium on Bt Brinjal should be used to improve the Biosafety Regulatory Process, not dismantle it. The public hearings on Bt Brinjal made it very clear that the public is seriously concerned about genetic engineering. They also made clear that there is a deep division between biotechnology technicians, rushing to blindly use the tools of genetic engineering, irrespective of their utility and their impact, and scientists from diverse fields who are aware of the ecological and health risks, and the socio-economic costs.

The Minister of Environment has stated that the Moratorium on Bt Brinjal will stay till a scientific consensus emerges. Such a consensus can only emerge from open dialogue and debate.

The BRAI proposal is an attempt to silence the debate, hijack the policy space and the regulatory process so that those who have subverted science and democracy can have undemocratic power to decide the fate of the nation.

And India is not alone in the rush for deregulation. Nina Federoff who was technology adviser to Hilary Clinton has called for removing hurdles of biotechnology regulations. (Ref : Nina Federoff "Engineering Food for All : Genetically Modified Crops have a track record of safety, but over-regulation is choking off innovation", International Herald Tribune, 20th August, 2011).

This cannot be allowed. It will lead to a dictatorship of the biotechnology lobby and the biotechnology industry.

It is a direct assault on Food Democracy.

7. The movement for Seed Sovereignty and Food Democracy

Navdanya was started in 1987 as a movement in India for defense of seed sovereignty and food sovereignty, anticipating threats of GMOs, patents on seeds and seed monopolies.

In 1991, when the draft of the Dunkel Draft text of the GATT Agreement was released, with farmers movements we organised massive rallies on seed sovereignty and farmers rights. These included the 500,000 strong rally in Bangalore in 1992 and the rally of 200,000 at Delhi's Red Fort in 1993, before the signing of the WTO agreement in Marakesh.

Following Gandhi, we declared "Bija Swaraj" (Seed Sovereignty) embodying the right of the seed to evolve and multiply in freedom and the rights of farmers to freely save and exchange and evolve seed.

We committed ourselves to Bija Satyagraha (Seed Satyagraha) the commitment to not obey the unjust laws that prevent farmers from saving seed.

In 1998, when Monsanto started its illegal Bt Cotton trials, with a broad alliance of movements, we started the "Monsanto Quit India" campaign.

Farmers in Karnataka burnt Bt Cotton. Farmers in Andhra Pradesh with the Government uprooted the illegal Bt Cotton trials.

We also sued Monsanto for its illegal Bt Cotton trials which resulted in Bt Cotton not being sold till 2002. Other legal cases included challenging the exclusion of food from GMO regulation and demanding labelling of GMO foods.

When Monsanto started its Bt Brinjal trials in 2000, we started the campaign to stop the commercialization. In February 2010, after a series of public hearings, the Minister of Environment, Jairam Ramesh, announced a moratorium.

In 2003, when the U.S sued Europe for its bans and moratoria on GM crops, with citizens across the world we launched a global citizens campaign.

The Seed Sovereignty Movement is now campaigning to stop BRAI, and to stop Monsanto's MOUs with State Governments. From 9th August, 2011, Quit India Day to 12th August, 2011, Navdanya undertook a Bija Yatra (Seed Pilgrimage) through Rajasthan to create awareness about the Monsanto MOU. Earth Bija Yatras for Bija Swaraj had been organised through the suicide belt from Sewagram in Maharashtra to Bangalore in Karnataka in 2006. In 2008, we undertook a Bija Yatra from Champaran in Bihar where Gandhi started the indigo satyagraha, to Rajghat in Delhi.

Besides seed pilgrimages we organize seed festivals to celebrate the biodiversity which is the result of centuries of farmers breeding.

In 2004, when the Government introduced a Seed Bill which would have prevented farmers from saving their own seeds, we did a nationwide seed satyagraha, and gave hundreds of thousands of signatures to the Prime Minister declaring that Seed Sovereignty was our birth right. The Bill had to be sent to a select committee of Parliament.

Besides resistance against Monsanto and GMOs, we have taken positive actions to defend our seed sovereignty and food sovereignty. More than 60 community seed banks have been created to protect seed as a commons and defend farmers rights to seed.

Organic farming is another strategy to keep our food GMO free. The organic movement in India is growing at 25% annually. In the heart of Bt Cotton suicide belt of Vidharbha, we have started a campaign on "Seeds of Hope" which is doubling farmers income through native seeds and organic farming.

While Monsanto pushes seeds of suicide, we protect and promote seeds of life.

* ***Vandana Shiva****, Director/Founder of The Research Foundation for Science, Technology and Ecology (RFSTE) and Director/Founder of Navdanya, India. She is a distinguished Indian physicist, environmentalist, and campaigner for sustainabilitiy and social justice. She is the author of numerous books and the recipient of a number of awards, including the Right Livelihood Award and most recently the Sydney Peace Prize.*

APPENDIX - 1

MONSANTO LICENSEES

Monsanto Licensees (Seed Companies) : There are about 60 Licensees (Seed Companies) of Monsanto, selling over 300 brands. (New India Express 2011) Out of this 45 have their presence with about 150 brands in Vidarbha; one of the main Bt cotton growing region in the country. (RFSTE 2010 & RFSTE 2011) Along with these 45 licensees, remaining 15 have their market share in other states such as Andhra Pradesh, Karnataka, Madhya Pradesh and Punjab.

The list of Monsanto Licensees and their brands is given below :

MONSANTO LICENSEES : BT COTTON SEED COMPANIES AND THEIR BRANDS

Sr.No.	Seeds Companies	Brands
1.	Nuziveedu	Malika – 207 Bunny Shrimanth Dhanvan Krishak Mitra Kanak Kisan Manjeet Sunny
2.	Ankur	Ankur – 651 Akka Jai Ankur - 6328
3.	Rasi	Rasi-2 Rasi-578 Rasi- 530 Rasi- 530 Rasi- 377
4.	Mahyco	Bombino Neena MRC-7347 (Dr.Brant) MRC- 7351 MRC- 7301
5.	Krishidhan	Maruti- 9632 Super maruti- 441 Rakhi - 621 Pancham

		Trinetra Green Boll- 9 Prateek
6.	Paras	Paras- Atal Paras- Brahama Paras- Krishna Paras- Sudarshan
7.	Vikram	Vikram- 5 Vikram- 9 Vikram- 15 Vikram- 301 Vikram- 311
8.	Tulasi	Tulasi- 4 Tulasi- 1 Tulasi- 101 Tulasi- Bhaskar Tulasi- Takat Tulasi- Sainik
9.	Amreshwara	Chhatrapati Om- 39 Amar- 333 Wonder
10.	Vibha	Dyna Cash Grace Commondo
11.	Palmoor	Abhay Bhavya Madhura
12.	Pravardhan	Pravardhan – 31 Mahi – 333 Maneka Perfect Rudra Jumbo
13.	Ajit	Ajit – 155 Ajit – 11 Ajit – 33
14.	Ganga – Kavberi	GK – 205 GK – 218
15.	Daftari	Daftari – 9

16.	Sri Ram Seeds	Saraswati Sujata Nandini
17.	Sri Sathya Seeds	Gayatri Hanuman – 9
18.	Maneesha	Hira – II Bharni
19.	Nusun	Hero James Sigma
20.	Bio Seeds	Gabbar Gabbar Gold Drona Maharaja Chiranjeevi
21.	Maha Gujarat	Swabhiman
22.	Prabhat Seeds	Ganesh Hima
23.	Asian Agrri Genetics	Jhansi Charmy
24.	Kaveri Seeds	Encounter Colonel Bullet Jadoo Jackpot
25.	CenBiosis	Rambo Commondo Profit
26.	Yashoda Seeds	Monsoon Margo Yashoda – 759
27.	Nirmal	Shakti – 9 Maharani Nirmal – 21 Madhu
28.	US Agri Seeds	Obama
29.	Super Seeds	Veda – 9 Veda – 2 Shivam Super Nova
30.	Shiva	Tej

31.	Geo	Platinum – 608 Platinum – 988
32.	Atash	Braham Dev Dhanni
33.	Sarvodaya	Dhanwan
34.	Genesis	Reva Veer Hanuman
35.	Bayer	Surpass – Gold Mine Surpass – Dhanno Surpass – 1037
36.	Vinayaka	Vinayaka – 500
37.	Fortune	Swarna Chetna Deepti
38.	Green Gold Seeds	Gold – 50 Prince
39.	Basant	Sanjivani
40.	Devjan	Mahalaxmi
41.	Aadhaar	Raja Bhumija
42.	RJ Biiotech	RJ -101
43.	Geolife	Answer
44.	Safal Seeds & Biotech	Om Shri Sai
45.	Nanded	Nanded

(RFSTE 2010) & (RFSTE 2011)

Besides Monsanto there are two other companies JK Seeds and Nath Seeds, which have developed Bt Cotton seeds independently. Their brands are given below. (RFSTE 2010)

JK Seeds	JKCH -99
	JKCH – 666
	JKCH – 206
	Durga -
	Indira Vajra
	Ishwar
Nath Seeds	Vishwanath
	Jagannath
	Express
	Nagbaba

anti-GM perspectives; Monsanto sends letters threatening to sue the media. Consequently, mass media have largely stopped broadcasting information concerning GMOs. Monsanto Japan also threatens to sue scientists who deliver critical reports on GMOs.

Although there are currently no GM crops under cultivation, Japan imports GMO crops, and this has a severe environmental impact. Japan imports all GM crops as raw materials in the form of seeds. These have been found to spill during transportation, and successfully grow in the wild, Imported and spilled GM canola seeds currently threaten the local biodiversity of Japan by crossing with agricultural crops, local weeds, and other edible plants.
With regard to GM canola, there are quite a few new discoveries.

1. Wild-growing canola has been found to be tolerant to both Round Up (Monsanto's glyphosate herbicide) and Bayer CropScience's Basta herbicide.
2. Primarily an annual plant, GM canola is becoming perennial and can grow as thick as tree trunks with age rings.
3. Hybridization can occur with agricultural food crops like broccoli.
4. Hybridization can occur with weeds like tumble mustard.
5. It can be found growing everywhere, even places far from import harbors and food oil factories.

On the one hand, Monsanto is claiming its patent rights and strictly monitoring for any farmer using Monsanto's seeds without their permission. But on the other hand, they completely ignore the fact that their spilled GM canola is threatening the country's biodiversity. It clearly shows the company´s contradictory stance.

The anti-GMO movement in Japan has been lead by the NO! GMO Campaign. The secretariat is located with the Consumers Union of Japan. It is a joint effort working closely with many consumer cooperatives like Green Coop and Seikatsu Club, as well as organic food producers and local consumer groups who work with farmers, and also many other groups and individuals.

The NO! GMO Campaign works to halt domestic R&D and field trials of GM crops by monitoring and protesting - especially at the field trial sites. Monsanto once conducted R&D of its herbicide (Round Up) tolerant GM rice (RR rice), but they abandoned the RR rice completely in Japan after protests. Additionally, the Campaign has been successful in halting research conducted by Japanese institutes and private companies on a wide range of GM crops.

To prevent further contamination of GM canola, more than 1,000 citizens have been surveying the growth of imported GM canola near harbours and food oil factories every year all over Japan. The local activists have also carefully removed wild-growing canola plants and made annual reports.

To promote the Soybean Trust movement, consumers have been working with farmers in order to produce more soybeans domestically without chemicals and without GMOs. The movement organizes annual national gatherings. Currently, this movement is expanding its scope to address other crops.

To promote non-GMO agriculture, the Campaign organizes annual gatherings in different locations to spread the movement throughout Japan. Currently, more than 2,000 farmers and farmer groups

D. Asia Pacific

JAPAN
The Current Situation Regarding GM Crops in Japan - the Pressure to Adopt GMOs and the Citizen's Counter Movement

*By Amagasa Keisuke, No! GMO Campaign**

As a result of consumers' rejection and their initiative to actively oppose genetically modified organisms (GMOs), there is currently no commercial cultivation of GM crops in Japan. Previously, there were some farmers who cultivated GM soya supported by Monsanto, but all of these fields were quickly destroyed by neighbouring farmers.

Despite their strong rejection, Japanese consumers eat more GM food than anyone else in the world because they depend on imported food. Sixty percent of all food is imported, and much of it is GM.

The Japanese government has a close relationship with the U.S. government. This is why the GM food labelling rules in Japan are insufficient, and why Japanese consumers do not often realise that they are eating GM food.

Monsanto also has an active presence in Japan. The first thing Monsanto did in Japan was intervene and oppose the GM food labelling regulation. The biotechnology corporate giant pressured the U.S. government to urge the Japanese government to minimize the obligatory labelling category. As a result, the Japanese government does not have mandatory rules to label food oil products, which mostly uses imported GMOs, such as corn or soy, as raw material. Also, Japan now allows food with GMO residues of up to five percent to be labelled as "non GMO" and there are no GMO labels for animal feed. As a result, consumers have effectively lost their right to choose since they do not know which food products are GM.

In Japan, the environmental assessment of GMOs is regulated by the national Cartagena law (a law concerning the Conservation and Sustainable Use of Biological Diversity through Regulations on the Use of Living Modified Organisms). Food safety is regulated by the Food Sanitation law. However, the legal requirements are very loose.
Monsanto Japan is aggressive in controlling patents. Some Japanese research institutes and private companies have conducted research on GMOs, but Monsanto has blocked many of these efforts. As a result, most of the Japanese research and development (R&D) efforts were either abandoned or in some cases only striving for R&D in order to get their own patents through risky GM crops like "multiple disease tolerant GM rice," which has a big impact on the environment, and "pollen allergy alleviating GM rice," which may affect human health.

Monsanto Japan obstructs the anti-GM movement by using the "carrot and stick" method to influence the Japanese media and manipulate public opinion. The "carrot" is to influence the media by inviting them to visit the U.S. As a result, one of the three major newspapers, *Mainichi Shimbun*, started to publish pro-GM opinions. The "stick" is used if the media publishes or broadcasts some

have declared their land to be "GMO-Free Zones" (their total area amounts to 68,672.65 ha). The goal is to cover 10 percent of Japan's arable land.

To demand the revision of the GM food labelling regulations, the Campaign collects petitions and lobbies government. The current labelling regulations make it possible for GM food to sneak onto our dinner tables. The campaign has collected several petitions over the years and sent them to the authorities and the government, demanding proper revision of the labelling regulations.
The NO! GMO Campaign has a focus on international solidarity. It is not enough to fight against GMOs only at the national level.

Regarding the recent protest against GM wheat, the NO! GMO Campaign put pressure on Japanese wheat importers, and held meetings with the national and local governments in Canada and in the U.S. in 2004. By working with citizen's organizations in those countries, we delivered a petition signed by 440 groups representing over 1,300,000 Japanese individuals, which successfully lead to the withdrawal of Monsanto's Roundup Ready wheat application on June 21, 2004.
Japan imports canola from overseas for cooking oil. About 80% of canola was from Canada and the other 20% from Australia. Australia is the only country that can supply GM-free canola to food-importing countries like Japan, now that Canadian canola, on which Japan has been heavily dependent for cooking oil, is highly susceptible to GM contamination. To protest against GM canola, NO! GMO held meetings with local governments in four states of Australia and handed over petitions and appeals.

And to fight the onset of GM rice, we responded to Pesticide Action Network Asia and the Pacific (PANAP), and joined the Asian-wide Collective Rice Action (CORA). In November 2004 an "International Year of Rice NGO Action" initiative was organized with anti-GMO activists in Asia and started to work with Asian people in the struggle against GMOs and to prevent the spread of GMOs in Asia over the years.

When the Convention on Biological Diversity held its COP10/MOP5 conference in Nagoya, Japan, in 2010, the campaign organized an event called Planet Diversity. We held symposiums and a demonstration with 2,000 participants to appeal to foreign delegates and people from around the world to demonstrate that there is a strong opposition to GM crops in Japan.

***Amagasa Keisuke**, is a science journalist and Chairman of No! GMO Campaign. He is Deputy Head of Consumers Union of Japan. Since 1996, CUJ has been the center of the opposition to genetically modified food (GMO) in Japan, starting the "No! GMO" Campaign, and demanding mandatory labeling of all GMO foods.*
Consumer Union of Japan: http://www.nishoren.org/en/
http://cujtokyo.wordpress.com/2007/12/12/protest-against-decision-to-cancel-the-gm-moratorium/

D. Asia Pacific

AUSTRALIA
Genetic Manipulation: spin, hype and empty promises

*Bob Phelps, Frances Murrel, Katherine Wilson, Australian GeneEthics Network **

Introduction: The Shape of the Debate

Australians are famously early adopters of new technologies. Studies consistently show Australians have "high levels of trust in science," and are "comfortable with the rate of technological change in general." Despite this, most remain skeptical of the benefits claimed for genetic manipulation (GM) technologies, are opposed to GM food crops and food products, and are concerned about the multinational industries and regulations surrounding these. Every independent survey of Australians' attitude towards GM shows a majority — including farmers, food manufacturers and major retailers — opposes GM food products, and even industry focus group studies have found that support for GM foods "dropped" by 2010, along with "a drop in perceived value of using biotechnologies to address climate change and to produce biofuels." A 2010 Institute for Social Research survey of a random sample of 1,000 Australians found that:

When people were asked how comfortable they were with genetically modifying plants for food, the average score was 3.9 on a scale of 10 with zero being "not at all comfortable" and 10 being "very comfortable."

Yet the story of GM uptake in Australia is one of regulatory failures and industry "done deals," detailed in cases below. Over the past decade, policy has been framed not by the majority who bear the impacts of GM products, but by a sector of co-dependent GM proponents that the sociologist Sheldon Krimsky describes as "the industry-government complex [that] ignores the voice of its own citizenry". In the face of keen public opposition, GM products have been aggressively pushed by governments, regulators, industry and media — to the extent that personnel from these four interest groups have been interchangeable. There is a "revolving door" relationship, with biotech industry executives becoming government advisors and media commentators, and vice versa (detailed below).

Australians' concerns about GM are largely about environmental, health, ethical, legal and economic impacts, and by extension, resistance to concentration of power, undemocratic decision-making, loss of property rights (intellectual and land) and loss of national and market sovereignty and individual choice. More specifically, the past decade's debate has circled mainly around: the absence of adequate food labelling; moratoria on GM food crops; a paucity of effective regulation surrounding these crops; punitive contracts for farmers and no legal recourse for them or their neighbours in cases of contamination; exclusion, secrecy and absence of scientific rigour in regulatory processes; and the forcing of GM products on to unwitting markets — not just by Australian policy, but through WTO impositions. In *Edging Towards BioUtopia*, Professor Richard Hindmarsh describes Australia as having a "self-

regulatory model for scientific research adopted for industrial processes." Cases detailed below attest to Hindmarsh's view of "a market-driven framework that dominated science policy, and gives special preferences to the biotechnology industry in law, regulation, taxes and access to intellectual property."

Australians' concerns have been dismissed by authorities as irrational and 'anti-science', while proponents' positions are framed as value-neutral, objective and progressive. In 2007, for example, as the state of Victoria faced a review of its moratorium on GM canola, Australia's then Chief Scientist Jim Peacock (himself a biotech entrepreneur, holding controversial patents for banned GM products) characterised those supporting the moratorium as "unprincipled minorities" and "ill-informed environmental activists", a view that neither aligned with evidence nor improved the public's trust in science. That same year, Swinburne University's *National Technology and Society Monitor* reported that public "comfort for genetically modified (GM) plants and animals for food remains relatively low." A more recent study "found that the problem for GM agriculture is not so much public ignorance, but rather a lack of trust in the institutions responsible for its commercialisation."

Studies consistently show that more informed and educated people are less likely to support GM products. Moreover: "Since 2007, there has been a significant decrease in the proportion who perceive genetic modification and biotechnology in food production as useful". An earlier (2003) study agreed that "Australians do not trust key institutions such as government, major companies or the media for information about new technologies."

The technocrats and the revolving door

Firm public resistance has presented a marketing problem for the complex of GM proponents.

Faced with what it regards as a "PR war", the GM sector has responded with secretive tactics, elaborated upon and referenced below. These include regulatory measures that deny public access to information, such as the non-labelling of foods manufactured using GM techniques, and the refusal to supply GM seed for independent scientific analysis.

From the start of GM regulation in Australia, pro-industry policy was a done deal. Before the Office of the Gene Technology Regulator (OGTR) was established in 2001, GM research and commercial activities were supervised under voluntary guidelines by the Genetic Manipulation Advisory Committee, formed in 1987. Most Australians' concerns centered around inadequate GM food labelling and a consequent absence of choice to buy GM-free food. No imported foods produced using gene technology were labelled as such, and the Howard government deflected public demands for labelling with the claim that labels and compliance might cost three billion dollars a year. A Department of Finance and Trade report put a more probable case against labeling. Put simply, the market wouldn't buy food labelled GM, so it was "uncompetitive" to give shoppers a choice. (More on labelling below.)

GM cotton was grown in Australia from 1996 and the seeds of government-industry partnerships that would characterise the next decade were already sown — to the extent that by 2010 Monsanto would own major shares in public-owned agriculture enterprises on top of its "links to over three-quarters of Australia's wheat handling industry through companies like CBH, Cargill and Agrium." State government Departments of Primary Industry would be

developing GM crops under contracts with the GM giants (see below).

By 1996, Australia's peak science organisation, the Commonwealth Science and Industry Research Organisation (CSIRO), had developed GM cotton with Monsanto's Bt transgenes, and this began to be commercially farmed in New South Wales and Queensland. The only other GM crop grown commercially was the Florigene blue carnation, developed in Melbourne but now owned by the Japanese company Suntory.

The first Gene Technology Regulator was Sue Meek. Meek's resume championed her skills in "commercialisation of biologically-based ventures" and "promoting the establishment and development of biotechnology-based industry." At the time of her appointment, Meek also held a position as Executive Officer of the South Australian Biotechnology Promotion Committee, and she remained a member of AusBiotech, the body "dedicated to the development and prosperity of the Australian biotechnology industry." Advising Meek was Michael Leader, who had worked for AgBiotech and CropLife, and who would go on to advise Monsanto and lead its Regulatory Affairs team. Soon after Meek's appointment, the Network of Concerned Farmers (NCF) was among those calling for a parliamentary inquiry, arguing that the Meek appointment presented conflicts of interest and that the OGTR had "ignore[d] submissions, ignore[d] advisory committees and misrepresent[ed] the legislation."

No inquiry was forthcoming, and in 2002 the OGTR granted two GM canola licences — Monsanto's "Roundup-Ready" canola, a crop that tolerates being sprayed with the herbicide Roundup (glyphosate); and Bayer's Liberty Link, which tolerates being sprayed with Liberty (glufosinate). These allowed farmers to saturate their crops with herbicides without killing the canola plants. A UK government finding about these crops had clearly questioned the basis of the OGTR's assessment that GM products caused no more harm than conventional products, and prompted the Australian Gene Ethics Network to urge the regulator to revoke Bayer's unconditional commercial licenses and refuse Monsanto's application.

Indeed, the licences imposed no restrictions or conditions, such as buffer zones, segregation systems or monitoring regimes on the licensees or their agents. Two days after Bayer and Monsanto's application to the OGTR, trial crops in Wagga-Wagga had contaminated neighbouring crops. But "no response came from the OGTR or any other government authorities, even as another breach was exposed in November 2003".

Nor did the OGTR licences take into account health, safety or environmental risks. In a Senate Estimates session, Sue Meek was asked whether the OGTR commissioned any research on the impacts of GM crops on biodiversity in Australia:

Dr Meek: No, we have not.

Senator CHERRY: What research have you commissioned on the issue of human health effects of GM crops?

Dr Meek: Directly, we have not commissioned research. Obviously, Food Standards Australia New Zealand does a lot of work in assessing food products.

Senator CHERRY: But they have commissioned no research either.

Indeed, Monsanto, Bayer, Nufarm and other GM enterprises had little to fear from Food Standards Australia and New Zealand (FSANZ), the other principal regulator of GM food products in Australia. FSANZ, which has approved every GM application to date, relies solely on GM company-provided data for its assessment of safety, and does not require the type of independent testing that detected novel protein byproducts and consequent allergic responses from some GM foods, including Australia's own GM field pea. (discussed further below). This policy has not gone without opposition: Professor Jack Heinemann, geneticist and former US National Institutes of Health scientist, said FSANZ "did not use the internationally accepted protocol for carrying out a rigorous scientific analysis". Nutritional biochemist and epidemiologist Dr Judy Carman said: "The GM pea provides a clear example of the failings of our current GM food regulatory regime. The pea failed miserably on all the [independent health] tests conducted. Our food regulator does not require these tests. There is clear and robust scientific evidence that the allergy assessment conducted by our food regulator is completely inadequate."

Politicians and media, too, later reflected community concern. An *Age* editorial stated: "To ask Big Agribusiness about GM is a little like consulting Big Tobacco about the risks of smoking." West Australian Premier Alan Carpenter said:

> *I find it unbelievable and unacceptable that the national food regulator relies principally on the say-so of the GM companies when assessing GM foods as safe to eat.*

More recently, the Auditor-General criticised shortfalls in FSANZ's adherence to its own standards, saying "either the information was not provided by the [GM] applicants; or FSANZ had not documented whether the requirements were met."

Happily for Bayer, Monsanto and Nufarm, these concerns were ignored — and remain so. But the GM companies, given the green light from Australia's federal regulators, faced other regulatory hurdles. Responding to public opposition and also resistance from key markets including Japan and Europe, Australian state governments had imposed temporary moratoria on the sale of the seed and declared their states GM-free zones for marketing reasons, under Section 21 of the *Commonwealth Gene Technology Act 2000*.

However, with reviews of the bans looming, the GM industry mobilised. An army of industry lobbyists and industry-funded researchers and agronomists flooded the media with stories and commentary that advanced the case for GM crops and food, using rhetorics of progress, revolution, competitiveness and inevitability — and of ignorance, fear-mongering and anti-science sentiments on the part of objectors. (Many of the articles over the next 5 years, from different sectors, sung to the same international playbook, to the extent that one Australian commentator was accused of plagiarising a British columnist.) With strategic precision, the GM sector also organised government and industry-hosted forums in targeted rural locations. These were consistently on-message, again framing public concerns as anti-progress and hysterical, and the pro-GM line as objective and critical for Australia's economic and environmental prosperity.

Lending credibility to these rhetorics was Australia's peak science body CSIRO, which enjoys high levels of public trust and is regarded as a public-interest research body. Yet under the direction of Australia's Chief Scientist Jim Peacock, who lobbied to overturn GM bans and who holds patent applications on banned GM products, CSIRO Plant Industry became increasingly commercialised, fostering strategic partnerships with GM giants including Monsanto and Bayer. Although CSIRO policy states: "where diversity of scientific views exists make reference to the range of scientific perspectives held within CSIRO," in the case of GM food, a senior scientist who spoke publicly about the hazards of GM crops was sacked from the organisation (see below). By the time the states' GM bans were up for review, CSIRO Plant Industry had developed several GM product patents that depended on bans being lifted for their commercialisation, and the biotech industry sought to "leverage" on CSIRO's public trust to "confront" those who oppose GM. According to a 2003 report in biotech industry magazine *Australian LifeScientist*:, a recent opinion poll found that 90 per cent of Australians trust the national research agency — by a large margin, it continues to be the nation's most trusted institution… CSIRO […] has been a non-combatant in the GM debate… Many believe CSIRO should have leveraged that respect to confront and refute anti-GM activists… CSIRO's biotechnology strategy coordinator, Dr Mikael Hirsch, shares these concerns. He says senior scientists at CSIRO Plant Industry, like chief Dr Jim Peacock and deputy Dr TJ Higgins, have "done their bit" to defend agricultural gene technology, but … he admits CSIRO may not have taken a strong enough line on the issue… Hirsch concedes that perhaps the research and agricultural communities need to do more and be more proactive in the debate.

Despite the mounting conflict-of-interest scandals besieging CSIRO, and despite CSIRO's own policy that forbids advocacy and calls for "care… when speaking about work with commercial potential," the body was an aggressive GM industry proponent, with Peacock and Deputy Chief of CSIRO Plant Industry, TJ Higgins at the forefront. One example of this emerged when Higgins wrote on behalf of CSIRO to more than 50 chefs who had signed Greenpeace's GM-free Chefs Charter, urging them not to boycott GM food products. Higgins, whose claims about the safety of GM foods have attracted criticism from scientists, is CSIRO's co-inventor of the GM field pea. The pea, spliced with a bean gene, cost more than $2 million to develop but was abandoned because it caused immune system dysfunction and lung-damage when fed to mice. Higgins nonetheless wrote to chefs that independent studies had found no "connection between health problems and GM food". He also lent CSIRO's support to FSANZ' assessment processes. "CSIRO Plant Industry supports FSANZ's comprehensive evaluation of GM foods," he said. A Greenpeace spokesperson was later reported as saying: "Higgins has clearly, and not for the first time, crossed the line between being a scientist and biotechnology industry lobbyist."

But CSIRO's advocacy was chorused by an echo-chamber of lobbyists who claimed scientific 'consensus' on the issue of GM. Among these was the Institute of Public Affairs (IPA), a free-market think-tank that campaigns against citizen-supported NGOs such as the Australian Conservation Foundation. The IPA is on record as listing Monsanto as one of its funders,. Its 'research fellows' enjoy weekly columns, radio spots and commentary in most major media around Australia. In addition to a flood of pro-GM publicity, the IPA organised parliamentary forums with hand-picked scientific panels, and also industry insider events. One such forum, in the Victorian Legislative Council committee room, was attended by Labor MP Tammy Lobato, who reported afterwards:

> *The IPA wheeled out the usual GM promises. [The IPA's] Jennifer Marohasy said the bans were 'irresponsible', and were 'killing' Victoria's canola industry. The next day I opened my copy of The Weekly Times to learn that Victoria now has record high yields of canola.*

Another IPA forum, 'How to beat activists at their own game', held in April 2005, featured Canadian GM publicist Ross Irvine, who stated that "'Corporate responsibility' is a weakness. 'Corporate responsibility' is letting someone else set the agenda." Irvine's workshop toured Australia and was attended by federal, state and local government representatives, as well as Bayer, Graincorp, Dairy Australia, Nufarm (manufactures and distributes Monsanto herbicides), Department of Primary Industries, and Orica (industrial explosives). The workshop repeated Irvine's on-the-record advice to Croplife executives in 2004:

> *Take the moral high ground. Assume a position of moral leadership. In the case of biotechnology, talk about addressing the problems of world hunger and malnutrition by adapting crops to some of the world's harshest farming conditions. Talk about making foods safer by eliminating allergens. Talk about improving the environment by reducing chemical usage. Talk about improving human health on a world scale by making foods healthier. Talk about biotechnology's contribution to food security. Tell the world that genetically modified foods are the next green revolution bringing boundless benefits to countless millions of people around the world. Tell politicians that when they support biotechnology they are demonstrating much needed moral and political leadership. Conversely, you may want to point out the immorality of those who oppose biotechnology.*

Drawing on the teachings of RAND, a US military think-tank, the workshops coached participants in tactics to "fight with networks" to "beat" and "attack" citizens groups, including setting up rival faux citizens' groups, or 'astroturf'. So it was no surprise that a network of new pro-GM 'citizen' groups emerged, advancing the rhetorics of "moral leadership" promoted by Irvine. These included the Australian Environment Foundation (AEF), a group whose name could be confused with the genuine citizen-supported Australian Conservation Foundation (ACF), but whose registered founders were the IPA's GM campaigners Jennifer Marohasy and Mike Nahan; whose directors included the IPA's Max Rhesse and Climate Skeptic Party president Leon Ashby; whose listed place of business was identical to the IPA address; and whose phone number was identical to that of the Victorian office of the logging industry front group, Timber Communities Australia (the group's first 'environment award' went to Gunns timber company). Chaired by television celebrity Don Burke, the AEF enjoyed plentiful media access to promote GM as environmentally responsible and the solution to climate and pest control problems.

The GM network extended its campaign through rural media and regional speaker forums that framed the issue for farmers as one of "freedom of choice" against "lagging behind". One group targeting farmers was the Producers Forum, sponsored by Bayer CropScience and Nufarm Limited which had participated in IPA forums, and Agrifood Awareness Australia (AFAA), an "industry initiative, established to increase public awareness of, and encourage informed debate and decision-making about gene technology." Also mounting campaigns were Croplife Australia (the peak body of the agricultural chemicals industry), Ausbiotech, the National Farmers Federation (Australia's peak farming body) and the Grains Research and Development Corporation (GRDC), which has strategic partnerships with Bayer and Monsanto.

The GRDC is funded by Australian grain grower levies and matching taxpayer funds — so when citizen NGO Gene Ethics exhausted its attempts to get media coverage for scholarly studies showing negative impacts of GM, its supporters considered the GRDC's magazine for graingrowers, *Ground Cover*, a suitable medium to provide farmers with alternative data about crop yields and safety. Gene Ethics supporters raised enough money to buy a series of advertising spaces in *Ground Cover*. After publishing one ad, *Ground Cover* cancelled subsequent Gene Ethics ads. "We can't even buy media space," said Gene Ethics executive director Bob Phelps.

Nor could farmers air their concerns. In *Edging Towards BioUtopia*, Hindmarsh describes the ways in which the GM promotional network has created a "social agenda behind the development and regulation of genetic engineering" that "has been constructed or shaped to exclude public knowledge, debate and participation." West Australian graingrower Julie Newman, who ran a 10,000 hectare wheat property and who owned one of the largest seed-grading factories in WA, reported on the Network of Concerned Farmers (NCF) site:

My personal experience in Grains Council of Australia confirmed the underhanded tactics used to silence opposition against GM. Presentations claiming 'unanimous' support ignored my vote opposing accepting a GM tolerance level in seed stocks. Deliberate attempts to publicly humiliate me included a statement at the well-attended National Grains Week conference "Not you Julie, anybody but Julie Newman can ask a question". At the time, I was vice president of WA Farmers grains council. I was threatened with legal action when I publicly commented that GCA acted against the policies of the organisations they represent.

Newman also alleged that threats were made against her family by big agribusiness players. She is not alone in these allegations (see below, p. 19).

The networking and exchanges between all these industry groups were not just ideological — they were fiscal.
By 2003 GM multinational interests had bankrolled their way into the heart of seemingly democratic bodies like farmers' federations. An *Age* report described a Monsanto and Bayer-sponsored Victorian Farmers Federation (VFF) meeting in Mildura, which took votes on lifting the moratorium "after a full morning session addressed by speakers from industry and government supporting the new technology", with VFF heavyweights' anger and aggression towards farmers in support of GM bans. It continued: Searches of documents from the Australian Securities and Investments Commission indicate that McGauchie's anger might have had as much to do with agribusiness as it did with agriscience and agripolitics… he shares with other VFF luminaries links to a variety of organisations with financial interests in the introduction of GM crops… Company searches, continued the report: reveal that like McGauchie, Hards - who is also a representative on the federation's general council and on the Grains Council of Australia - also has directorship links to companies that could profit from GM. GrainCorp directors include McGauchie and former VFF grains president, Kerang farmer Allan McCallum. A spokesman for Monsanto, Mark Buckingham, has confirmed to *The Age* that GrainCorp was one of the companies his organisation was negotiating with to be the handler of segregated GM canola after a licence was granted.

Many of these forums, meetings and workshops featured speakers who included farmers on Monsanto's payroll. But to further "leverage" on public trust, biotech marketers had strategised to enlist university and CSIRO scientists —

criticised for being "non-combatants" in the GM "war" — to sell the GM message. Public scientists identified as having "interests in GM agriculture" were regarded as important and trusted authorities who could be enlisted to extoll GM technologies.

This situation would rapidly change, to the extent that industry bodies were advising university scientists on media management. A posse of university- and institution-endorsed scientists, many sponsored by GM companies and their industry alliances, became regular proponents on the GM media commentary and public speaking circuit. These included (but are not limited to):

• The University of Melbourne's David Tribe, described by the industry as "the agbiotech research community's most proactive defender";
• The University of Melbourne's Rick Roush, who has worked with the (Monsanto-sponsored) IPA and is advisor to AusSMC (see below).
• The University of Adelaide's Chris Preston. Dr. Preston has published with industry front group Agbioworld and reportedly failed to disclose Monsanto and Bayer funding for a peer-reviewed publication with positive findings on GM canola dispersion.
• The University of Adelaide's Mark Tester,
Professor Tester is an expert in the genetics of plant salinity tolerance. He spent a sabbatical year working with Monsanto, and reportedly left Britain because of its "climate of virulent opposition" to GM crops.
• The IPA's Jennifer Marohasy. The IPA has produced many newspaper features on GM, some of which warned about governments "pandering to irrational green hysteria" and GM "Luddites" who are "wealthy, professional, influential and commercially motivated and funded."
• Former Chief Scientist and CSIRO Plant Industry head Dr Jim Peacock,
Dr Peacock described those wishing to keep the bans as "self-interested" and "unprincipled minorities".
• Former CSIRO Plant Industry deputy head, Dr TJ Higgins
Dr Higgins is co-inventor of the ill-fated $2 million CSIRO GM field pea, abandoned because it caused lung-damage when fed to mice, accused of shrinking his responsibilities as a disinterested scientist and who instead has become an industry lobbyist.
• The University of Western Australia's Dr Ian Edwards, Dr Edwards is Chairman of the AgBio Advisory Group in AusBiotech, managing director of Edstar Genetics, who served on the Commonwealth Government Biotechnology Consultative Group (BIOCOG-1999/2000).
• Agronomist Bill Crabtree
Dr Crabtree received an award from the GRDC for "excellence in communication" about biotechnologies. Crabtree is a GM entrepreneur who reportedly has commercial partnerships with Ian Edwards and owns rights to GM salt-tolerant wheat, according to the Network of Concerned Farmers (NCF). NCF also claims Crabtree "aggressively confronts those that express concerns against GM and regularly confronts media if any GM concerns are reported. He regularly writes damning letters to the media slamming those opposing GM crops (www.no-till.com.au) and is well promoted by the media making outrageous statements such as stating that I and the Network of Concerned Farmers should be "wiped from the face of the earth."" (ABC News).

How the GM bans were lifted

The network of GM proponents, throughout the last decade, projected increasingly inflated figures of improved crop yields and export markets for farmers and investors. By 2008, the Australian Bureau of Agriculture and Resource Economics (ABARE) claimed that adopting GM crops — including GM wheat and rice — would benefit Australia to the tune of $8.5 billion. The journalist Bernard Keane, who describes himself as "agnostic on the advantages or disadvantages of GM crops" responded in a report mapping ABARE's "consistent failures" to accurately forecast in many industries, pointing out:

GM wheat and rice aren't even available yet… the report was based on assuming every single farmer in the country immediately switched – right now, in 2008 – to GM crops. Including non-existent GM wheat and rice. When challenged, ABARE admitted that the report was entirely hypothetical. However, that didn't stop Philip Glyde from declaring in a press release that "delaying GM uptake means we are forgoing significant economic benefits for regional Australia." [ABARE] represent, at best, consistently poor research and modelling. But they are not without real world consequences, because they form the basis of long-term government policy.

Government modelling also relied on GM company profit (and crop yield) projections that were equally overblown — but investors and farmers were yet to learn how fanciful they were. For its "wholly misleading representations about its profit capacity", Nufarm (the sole Australian distributor of Monsanto's Roundup) is being sued by class action for allegedly misleading the market.

Improved profits weren't the only inflated claims. Despite the expenditure of US$45 billion dollars of public and private money over the past 20 years, the promises of commercial GM crop varieties with increased yield, drought-tolerance, salt tolerance, enhanced nutrition, nitrogen-fixing grain, longer shelf life or other traits had not eventuated. This didn't go unnoticed in the scientific community. A *New Scientist* editorial asked:

Where are the spectacular benefits of genetic modification we were promised? …the biotech crops that might really help feed the world's hungry remain but a hazy future promise. Meanwhile, bold advances in conventional breeding mean that transgenic plants offer fewer advantages than we once thought.

In a bold public relations manoeuvre, this was re-framed by proponents as the very reason to revoke the moratoria. That potential GMO traits took decades to develop, costing hundreds of millions of dollars with uncertain outcomes and risks, meant that Australia should end the bans to encourage investors "with deep pockets and brave hearts" into agbiotech, argued science entrepreneurs such as Glenn Tong, who has many personal GM company interests.

Although this manoeuvre and its rhetorics — along with a $10 million federal government brochure campaign extolling GM's "potential to provide foods that are healthier, safer" — failed to sway public opinion, it was apparent that lifting the bans was a *fait accompli* in Victoria and New South Wales (and later, Western Australia). While in 2004 Victoria's Agriculture Minister Bob Cameron stated that the commercial release of GM canola "would represent a point of no return for Victoria… The Government believes the risks to export markets outweighs any perceived

benefits," by 2007 governments had done a sharp u-turn with the Minister for Trade, Warren Truss, calling GM bans "idiotic" and the arguments for keeping the bans "nonsense".

In May 2007 the Victorian government announced that an 'independent' panel would 'review' the bans, and offered an impression of community consultation. ". On the panel were retired medical researcher Sir Gus Nossal, then Victoria's Chief Scientist as joint-principal of Foursight Associates, philanthropist, and biotechnology entrepreneur who had spoken in support of GM products, and Merna Curnow who represented the pro-GM GRDC. The third panellist was farmer Christine Forster. Although none on the review panel was an economist, the terms of the review were exclusively economic, and the public had no avenue to present legal, ethical, health or environmental arguments against lifting the ban.

An August 2003 Biotechnology Australia poll had reported 74% of farmers surveyed were not considering using GM crops, and its 2006 study found that "The Australian public see great risks from GM foods and crops and concerns are continuing to rise." These findings resonated with polls taken by AC Neilson, Roy Morgan, Millward Brown, *The Age*, *The Sydney Morning Herald*, Swinburne University and Choice magazine. Eighty per cent of farmers surveyed in a 2002 poll taken by the SA Farmers Federation supported a ban on GM food crops. Coles Supermarket government relations advisor Chris Mara told a Parliamentary forum that "Coles listens to our customers and over 90% do not want GM ingredients in their food."

The ABC had reported there was 'no market' for GM canola in Australia. Processors would not buy GM canola because "customers are not interested in buying GM product". But without adequate labelling of GM foods, there could be little local market resistance. In 2007 it was announced that bans of GM canola in Victoria would be lifted in 2008.

[Premier John] Brumby said the state government had accepted federal government approval and the findings of Sir Gustav's report.
Mr. John Brumby said lifting the ban would make Victorian farmers more internationally competitive and deliver environmental and economic benefits to the state. "In direct terms, the review panel concluded that the economic benefit to the state over the next eight years of this decision will be something like $115 million of additional economic activity," he said.

This was not to be. In March 2011, a surge in market premiums — with export markets paying $50 a tonne more for non-GM canola — confirmed that the market was demanding GM-free canola from Australia.

New South Wales followed Victoria in 2008. In 2005 the Labor state government in Western Australia, which had urged other states to keep their bans, commissioned the Institute for Health and Environmental Research (IHER) to research the effects of animal feed being mixed with genetically manipulated canola. But in 2010 the subsequent Coalition State Government abandoned the research (details below) and exempted commercial GM canola from the moratorium on GM crops. Agriculture Minister Terry Redman assured farmers and shoppers that trials had "proved GM and non-GM canola can be segregated and marketed separately" and that eleven events of contamination at

eighteen trial sites "were managed appropriately and segregation from paddock to port was achieved." However, in a stark turnaround in the face of the Steve Marsh contamination case (see below), the minister now argues that "zero per cent thresholds (of GM in organics) are unrealistic in biological systems". and is urging the organic industry to allow GM contamination in its supply chains. This is despite the domestic organic standard "AS6000", agreed by all governments and the organic industry, setting zero tolerance for any GM contact with organic food at any stage in the production process.

Tasmania, the Australian Capital Territory and South Australia will remain GM-free until 2014 at least.

Media compliance

With the bans overturned, a resistant public had yet to be placated. A powerful behind-the-scenes GM proponent was (and remains) the Australian Science Media Centre (AusSMC), a public relations body that generates and gatekeeps many news stories. AusSMC describes itself as "an independent, non-profit service for the news media, giving journalists direct access to evidence-based science and expertise."

AusSMC was initiated in 2005 in Adelaide by Baroness Susan Greenfield, also patron of the British Science Media Centre, an organisation accused by *The Guardian* of being set up "to promote the views of industry and to launch fierce attacks against those who question them." However, criticism of AusSMC is problematic, as it is funded not only by corporate giants but also by most of the major media outlets to which it generates stories (including the ABC and commercial stations, Fairfax and News Limited) — as well as state governments and universities, making it ostensibly public-interest based and "free of bias" (as it claims to be). Yet close scrutiny of its forums reveals systemic biases in its uncritical GM reportage, and many who sit on its advisory board are committed biotech industry proponents, some with undisclosed industry links.

To the proponents, science communication is viewed as staying 'on message': not as engaging in free debate about contested science, or public discussion about scientific process. When asked why its GM advisers were exclusively pro-GM, AusSMC's Media Manager Lyndal Gully replied:

There was no attempt to line up a panel with a particular GM viewpoint … [but] if scientists on the panel are more likely to end up arguing with each other rather than answering journalists' questions, then there is a good chance that the science (that all sides are trying to communicate) will be lost in the story.

That 'story', though, had already been revealed in a content analysis of all major newspaper articles about GM in Australia's canola-growing states until 2004. The analysis found that without exception, quoted scientists (many claiming "scientific consensus" about GM) received funds from biotech companies, sponsored think-tanks, or interested bodies, or were on regulatory bodies. Not one dissenting or independent scientist was quoted.

A 2005 doctoral study also concluded that an overwhelming majority of Australian science journalists had an uncritical attitude towards reporting GM products, and followed official and industry approaches by reporting

science and technology in the positivist tradition. In Australia, GM journalism doesn't adhere to the ideal 'conflict' model of news reporting, where competing values and knowledge-claims are given equal time to battle it out. Instead, for the most part, it relies on officially-condoned authority figures to transmit 'accurate' information about technology and 'innovation', viewing this as apolitical and unproblematic.

While a notable few Australian journalists have started including the views of farmers, scientists and others who question the claims made for GM, the past decade saw an almost comic asymmetry in media 'debates', with hostility to GM-free advocates that lapsed into hysteria.

However, none of the proponents' media rhetorics are supported by evidence. A body of studies show that citizen-supported NGOs such as the Public Health Association of Australia, the Australian Conservation Foundation, the Network of Concerned Farmers, Greenpeace and Gene Ethics have widespread and mainstream support, and that their campaigns follow — rather than lead — community concerns in Australia. The view that they are unduly influencing policy or public opinion, according to La Trobe University economist Tim Thornton,
sits badly with basic reasoning and observation. The evidence reveals that humanitarian and environment groups enjoy wide support among the electorate, but they actually have little influence on policy compared with business lobbies.

Dissenting scientists and 'degradation rituals'

Australian scientists are discouraged from airing their concerns about GM in a number of ways. The first obstacle is a refusal by GM companies to allow analysis of their patented products. Scientists have universally condemned this obstacle across the globe. A report in the Farm Policy Journal describes how *The Scientific American* journal (August 2009), *Nature Biotechnology* (October 2009) and the *New York Times* (February 2009) report that GM companies prohibit independent researchers from accessing the GM material needed for environmental and health research, and censor adverse findings.

After the West Australian Labor government commissioned a safety study into GM canola, study leader Dr Judy Carman told the ABC:

[T]he GM industry puts these restrictions on the ability to actually get hold of the materials to do independent safety testing… [the industry] delayed us for years.

Ostensibly because of the time it took to be finalised, reviewed and published, the present Liberal/National Coalition government abandoned the study. Nutritionist and biochemist Dr Rosemary Stanton OAM explains:

Independent researchers have found it almost impossible to get GM seed to carry out safety checks and any farmer who buys seed is forbidden to allow it to be used for research purposes. Scientists who question the technology are marginalised.

Section 1.13 of Monsanto's 2008 Roundup Ready canola grower license and stewardship agreement also said "Grower shall NOT plant any Roundup Ready canola seed Grower has produced or use or allow others to use such seed for crop breeding, research, or generation of herbicide registration data."

The issue has become so divisive scientists are intimidated. When asked by *Crikey.com* why it only enlists pro-GM scientists in its media panels, AusSMC's CEO Susannah Eliot replied:
"The issue is so polarised it gets tricky to select a panel. Many scientists are happy to discuss the issues privately but aren't willing to speak publicly because they don't want to be labelled as pro- or anti-GM".

There is little consequence for GM proponents, but those who question or criticise the claims made for GM technologies, or who urge a precautionary approach to GM products, have suffered huge personal consequences. One example of this was the sacking of Dr Maarten Stapper, a principal research scientist at CSIRO. Dr Stapper was reportedly "sceptical about claims that GM plants improved crop yields and called for more studies on the safety of GM stockfeeds". He was subsequently sacked in 2007 after 23 years of service. Dr Stapper said his sacking was because of his criticism of GM crops. CSIRO reportedly "tried to gag" his criticisms and "bullied and harassed" Dr Stapper to "give up all my beliefs about good agriculture and keep my mouth shut about GM." He is reported as saying: "I didn't want that because I have a connection with the farming community and they trust me."

Another example is the case of Dr. Carman who has been repeatedly defamed and intimidated for over ten years for exposing the deficiencies in current GM crop safety assessments and for calling for independent safety testing of GM crops. One instance of this is a letter sent to senior public health figures in Australia, accusing her of "killing people in third world countries by denying them the benefits of GM crops". There were separate attempts to have her removed from a university position, as well as alleged physical bullying and intimidation. Much of it "has come from academics in Australia who are associated with GM crop companies".

Griffith University's Richard Hindmarsh has asked:

Why was Carman stigmatised instead of science being allowed to take its normal course in exploring and questioning scientific findings?

Current state of play

The demand for Australia's GM-free canola remains so strong in Europe that Co-operative
Bulk Handlers (CBH) marketing manager, Peter Elliott, wrote in 2010:

When you're growing GM, at the moment you need to compete against Canada, but when you've got non-GM you get a free kick into Europe and some markets in Japan. There's a massive advantage to be growing non-GM this year, because Europe has been so aggressively buying up all the non-GM tonnage.

Indeed, the rise in Australian canola exports was largely due to Canada losing the European market in 1999 after it

began growing and exporting GM canola. Rural Industries Research and Development Corporation reports:
"In 1990, Australia hit the global stage as an exporter of canola seed, and rapid growth led to our exports exceeding two million tonnes in 1999/2000. Our annual exports have now stabilised at around one to 1.5 million tonnes, and our main export markets are Japan, China, Pakistan, Europe and Bangladesh."

Lifting the bans has resulted in the problems predicted by those deemed "scaremongers" and "doomsayers", and the industry has failed to live up to the promises promoted by proponents. GM canola was just 8% of the Australian canola crop in the 2010 season, and it attracts $50 less per tonne than GM-free canola.

Nonetheless, lifting the ban has already imposed extra costs and risks on all Australian canola growers. Steve Marsh, a National Association for Sustainable Agriculture Australia (NASAA) certified organic grower in Western Australia lost his certification and premium markets when a neighbour's swathed GM canola blew over his farm in November, 2010. Both NASAA and the state Department of Agriculture confirmed positive GM tests on the wind-blown material. Monsanto claims to have reversed its earlier reported intention to back the GM grower (possibly fearing a McLibel-style public relations disaster) if Marsh sues the neighbour who grew the GM crop, The WA Pastoralists and Graziers Association (PGA) has started a GM support fund, with which Monsanto may indirectly have involvement.

The Australian government, which funded Biotechnology Australia to promote GM from 2000 until 2008, has now established the National Enabling Technologies Strategy (NETS) with a $38.2 million budget, to back GM and nano-technologies.

The labelling of GM food remains limited, excluding vegetable oils, starches and sugars made using GM techniques, so the many processed foods containing these basic ingredients are exempt from GM labelling. FSANZ explains: "When developing the labelling standard it was decided not to base it on tracing ingredients back to the original source to see if they were GM or not. This would have been very complicated for manufacturers to set effective systems in place to trace their ingredients overseas and also difficult for enforcement agencies to police." As a result, there is no monitoring, testing or enforcement of the GM labelling standard which is the responsibility of state governments.

The national food labelling report, issued in January 2011 after a long review, does not follow public demand for full labelling of all foods made using GM techniques. Of 6,000 individual submissions to the inquiry, more than 5,000 backed

comprehensive disclosure of information on food labels about the use of genetically modified foods, foods produced using nanotechnology and the declaration of additives and allergens on food labels.

Gene Ethics issued a statement arguing:

Australians were first asked in 1994 about GM food labels and every survey since then finds that over 90% want all

GM-derived foods to be fully labelled. Despite this, in recommendation 29 they say: 'only foods or ingredients that have altered characteristics or contain detectable novel DNA or protein be required to declare the presence of genetically modified material on the label'.

All GM vegetable oils, starches and sugars, as well as the eggs, meat and milk from animals fed GM feed and restaurant or takeway meals, are all exempt from any GM labelling. And a 1% threshold for 'adventitious' (accidental) GM contamination is also allowed. This allows many products to bypass the labelling law, selling processed foods that routinely (not occasionally) contain GM soy, corn, canola and cotton, and their derivatives.

Companies, including Kangaroo Island Pure Grain in GM-free South Australia, are benefiting from strong local and international demand for its non-GM canola and non-GM canola honey for which its growers are earning premiums.

As well as the majority of farmers who continue to grow GM-free, and food professionals (including chefs' alliances) committed to GM-free produce, there continue to be many citizen NGOs representing the public interest. These include:

GM-free Australia Alliance
Gene Ethics
MADGE
Doctors for the Environment Australia
Greenpeace Australia Pacific
Network of Concerned Farmers
Public Health Association of Australia
Choice
Just Food
SAGFIN

These networks represent the majority of Australians' views on genetic manipulation techniques and their products, and advocate on behalf of the Australian public for GM-free futures and agro-ecological food production systems. A very recent report by the United Nations special rapporteur on the right to food confirms earlier UN findings by 400 independent scientists that integrated systems which work with natural processes and biodiversity are, unlike industrial agriculture that includes GM crops and animals, capable of feeding all the world's people.

Conclusion

GM techniques and their products (plants, animals and microbes) cannot deliver on their false promises of plentiful food, fibre and materials. Despite the expenditure of billions of dollars of public and private resources over the past 30 years, the promises of commercial GM crop varieties with increased yield, drought-tolerance, salt-tolerance, enhanced nutrition, nitrogen-fixing grain, longer shelf life or other traits have not and will not come true. These empty claims divert scarce research and development resources from the key task of creating sustainable, ecological

farming and food production systems that can feed, house and clothe everyone well, in perpetuity. With oil and phosphate reserves diminished and global climate changing, amending industrial agricultural practices and securing food sovereignty must be a national and global priority. Our governments must retain firm command of this project and prevent corporations from owning and controlling the means of producing the global food and fibre supply. We have a responsibility to ensure that everyone's the rights to adequate food, clothing and shelter are supplied from the Earth's abundant renewable resources.

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Glossary of Terms

Biotechnology: The manipulation (as through genetic engineering) of living organisms or their components to produce useful usually commercial products (as pest resistant crops, new bacterial strains, or novel pharmaceuticals); also: any of various applications of biological science used in such manipulation. (http://www.merriam-webster.com).

Bt: *Bacillus thuringiensis*. A protein that is toxic to insects when ingested. Some plants have been genetically modified to create this toxin on their own.

DNA: The chemical make-up of genetic information.

Genetically Modified Organism: (As defined by the European Union) An organism is "genetically modified", if its genetic material has been changed in a way that does not occur under natural conditions through cross-breeding or natural recombination - Article 2 of the EU Directive on the Deliberate Release into the Environment of Genetically Modified Organisms (2001/18/EG). Also referred to as Genetically Engineered or Genetically Modified.

Glyphosate: An herbicide used with genetically modified crops, also the active ingredient in Monsanto's herbicide, Roundup.

Intellectual Property Rights (IPR): The rights given to persons over the creations of their minds. They usually give the creator an exclusive right over the use of his/her creation for a certain period of time. (http://www.wto.org/english/tratop_e/trips_e/intel1_e.htm)

Marker genes: Used in biotechnology to determine which cells have successfully received the new gene.

Promoter: The **a**rea of DNA that regulates gene expression.

Refugia: Percentage of non-engineered crops to be planted near the engineered crops to reflect the reality of the creation of resistant strains of insects. The conventional crops act as a refuge for insects to survive and breed, and keeps the overall level of resistance in the population low.

RNA: Ribonucleic acid essential for translating genetic information. It is used in key metabolic processes for all steps of protein synthesis in all living cells and carries the genetic information of many viruses .

Roundup Ready: Crops created by Monsanto to tolerate the herbicide glyphosate. Ex: Roundup Ready Corn and Roundup Ready Alfalfa.

Superweeds: Weeds resistant to existing herbicides that now require new chemicals to control. Most commonly refers to glyphosate-resistant weeds.

Transgenic organisms: A subset of genetically modified organisms that have inserted DNA that originated in a different species.

V. VOICES FROM SCIENCE

A. Warnings from Scientists

Biotechnology Myths

*Dr. Miguel Altieri, Latin American Scientific Society of Agroecology (SOCLA) **

The agrochemical corporations which control the direction and goals of agricultural innovation through biotechnology claim that genetic engineering will enhance the sustainability of agriculture by solving the very problems affecting conventional farming and will spare Third World farmers from low productivity, poverty and hunger (Molnar and Kinnucan 1989, Gresshoft 1996). By matching myth with reality the following section describes how and why current developments in agricultural biotechnology do not measure up to such promises and expectations.

Myth 1: Biotechnology will benefit farmers in the US and in the developed world.

Most innovations in agricultural biotechnology are profit driven rather than need driven, therefore the thrust of the genetic engineering industry is not to solve agricultural problems as much as it is to create profitability. Moreover, biotechnology seeks to industrialize agriculture even further and to intensify farmers' dependence upon industrial inputs aided by a ruthless system of intellectual property rights which legally inhibits the right of farmers to reproduce, share and store seeds (Busch et al. 1990). By controlling the germplasm from seed to sale and by forcing farmers to pay inflated prices for seed-chemical packages, companies are determined to extract the most profit from their investment.

Because biotechnologies are capital intensive they will continue to deepen the pattern of change in US agriculture, increasing concentration of agricultural production in the hands of large-corporate farms. As with other labor saving technology, by increasing productivity biotechnology tends to reduce commodity prices and set in motion a technology treadmill that forces out of business a significant number of farmers, especially small scale. The example of bovine growth hormone confirms the hypothesis that biotechnology will accelerate the foreclosure of small dairy farms (Krimsky and Wrubel 1996).

Myth 2: Biotechnology will benefit small farmers and will favor the hungry and poor of the Third World.

If Green Revolution technology bypassed small and resource-poor farmers, biotechnology will

exacerbate marginalization even more as such technologies are under corporate control and protected by patents, are expensive and inappropriate to the needs and circumstances of indigenous people (Lipton 1989). As biotechnology is primarily a commercial activity, this reality determines priorities of what is investigated, how it is applied and who is to benefit. While the world may lack food and suffer from pesticide pollution, the focus of multinational corporations is profit, not philanthropy. This is why biotechnologists design transgenic crops for new marketable quality or for import substitution, rather than for greater food production (Mander and Goldsmith 1996). In general, biotechnology companies are emphasizing a limited range of crops for which there are large and secured markets, targeted at relatively capital-intensive production systems. As transgenic crops are patented plants, this means that indigenous farmers can lose rights to their own regional germplasm and not be allowed under GATT to reproduce, share or store the seeds of their harvest (Crucible Group 1994). It is difficult to conceive how such technology will be introduced in Third World countries to favor the masses of poor farmers. If biotechnologists were really committed to feeding the world, why isn't the scientific genius of biotechnology turned to develop varieties of crops more tolerant to weeds rather than to herbicides? Or why aren't more promising products of biotechnology, such as N fixing and drought tolerant plants being developed?

Biotechnology products will undermine exports from the Third World countries especially from small-scale producers. The development of a thaumatin product via biotechnology is just the beginning of a transition to alternative sweeteners which will replace Third World sugar markets in the future (Mander and Goldsmith 1996). It is estimated that nearly 10 million sugar farmers in the Third World may face a loss of livelihood as laboratory-processed sweeteners begin invading world markets. Fructose produced by biotechnology already captured over 10% of the world market and caused sugar prices to fall, throwing tens of thousands of workers out of work. But such foreclosures of rural opportunities are not limited to sweeteners. Approximately 70,000 vanilla farmers in Madagascar were ruined when a Texas firm produced vanilla in biotech labs (Busch et al. 1990). The expansion on Unilever cloned oil palms will substantially increase palm-oil production with dramatic consequences for farmers producing other vegetable oils (groundnut in Senegal and coconut in Philippines).

Myth 3: Biotechnology will not attempt to move against the ecological sovereignty of the Third World.

Ever since the North became aware of the ecological services performed by biodiversity of which the South is the major repository, the Third World has witnessed a "gene rush" as multinational corporations aggressively scour forests, crop fields and coasts in search of the South's genetic gold (Kloppenburg 1988). Protected by GATT, MNCs freely practice "biopiracy" which the Rural Advancement Foundation (RAFI) estimates it costing developing countries US $ 5.4 billion a year through lost royalties from food and drug companies which use indigenous farmers' germplasm and medicinal plants (Levidow and Carr 1997).

Clearly, indigenous people and their biodiversity are viewed as raw materials for the MNCs which have made billions of dollars on seeds developed in US labs from germplasm that farmers in the Third World had carefully bred over generations (Fowler and Mooney 1990). Meanwhile, peasant farmers go unrewarded for their millenary farming knowledge, while MNCs stand to harvest royalties from Third World countries estimated at billions of dollars. So far biotechnology companies offer no provisions to pay Third World farmers for the seeds they take and use (Kloppenburg 1988).

Myth 4: Biotechnology will lead to biodiversity conservation.

Although biotechnology has the capacity to create a greater variety of commercial plants and thus contribute to biodiversity, this is unlikely to happen. The strategy of MNCs is to create broad international seed markets for a single product. The tendency is towards uniform international seed markets (MacDonald 1991). Moreover, the MNC-dictated provisions of the patent system prohibiting farmers to reuse the seed yielded by their harvests, will affect the possibilities of in-situ conservation and on-farm improvements of genetic diversity.

The agricultural systems developed with transgenic crops will favor monocultures characterized by dangerously high levels of genetic homogeneity leading to higher vulnerability of agricultural systems to biotic and abiotic stresses (Robinson 1996). As the new bioengineered seeds replace the old traditional varieties and their wild relatives, genetic erosion will accelerate in the Third World (Fowler and Mooney 1990). Thus the push for uniformity will not only destroy the diversity of genetic resources, but will also disrupt the biological complexity that underlines the sustainability of traditional farming systems (Altieri 1994).

Myth 5: Biotechnology is ecologically safe and will launch a period of a chemical-free sustainable agriculture.

Biotechnology is being pursued to patch-up the problems that have been caused by previous agrochemical technologies (pesticide resistance, pollution, soil degradation, etc.) which were promoted by the same companies now leading the bio-revolution. Transgenic crops developed for pest control follow closely the pesticide paradigm of using a single control mechanism which has proven to fail over and over again with insects, pathogens and weeds (NRC 1996). Transgenic crops are likely to increase the use of pesticides and to accelerate the evolution of "super weeds" and resistant insect pests strains (Rissler and Mellon 1996). The "one gene - one pest" resistant approach has proven to be easily overcome by pests which are continuously adapting to new situations and evolving detoxification mechanisms (Robinson 1997).

There are many unanswered ecological questions regarding the impact of the release of transgenic plants and micro-organisms into the environment.

Among the major environmental risks associated with genetically engineered plants are the unintended transfer to plant relatives of the "transgenes" and the unpredictable ecological effects (Rissler and Mellon 1996).

Given the above considerations, agroecological theory predicts that biotechnology will exacerbate the problems of conventional agriculture and by promoting monocultures will also undermine ecological methods of farming such as rotation and polycultures (Hindmarsh 1991). As presently conceived, biotechnology does not fit into the broad ideals of a sustainable agriculture (Kloppenburg and Burrows 1996).

Myth 6: Biotechnology will enhance the use of molecular biology for the benefit of all sectors of society.

The demand for the new biotechnology did not emerge as a result of social demands but it emerged out of changes in patent laws and the profit interests of chemical companies of linking seeds and pesticides. The supply emerged out of breakthroughs in molecular biology and the availability of venture capital as a result of favorable tax laws (Webber 1990). The danger is that the private sector is influencing the direction of public sector research in ways unprecedented in the past (Kleinman and Kloppenburg 1988).

As more universities enter into partnerships with corporations, serious ethical questions emerge about who owns the results of research and which research gets done. The trend toward secrecy by university scientists involved in such partnerships raises questions about personal ethics and conflicts of interest. In many universities a professor's ability to attract private investment is often more important than academic qualifications, taking away the incentives for scientists to be socially responsible. Fields such as biological control and agroecology which do not attract corporate sponsorship are being phased out and this not in the public interest (Kleinman and Koppenburg 1988).

Conclusions

In the late 1980's, a statement issued by Monsanto indicated that biotechnology would revolutionize agriculture in the future with products based on nature's own methods, making farming more environmentally friendly and more profitable for the farmer (OTA 1992). Moreover, plants would be provided with built-in defenses against insects and pathogens. Since then many others have promised several more valuable rewards that biotechnology can bring through crop improvement. The ethical dilemma is that many of these promises are unfounded and many of the advantages or benefits of biotechnology have not or may not be realized. Although clearly biotechnology holds promise for an improved agriculture, given its present orientation it mostly holds promise for environmental harm,

for the further industrialization of agriculture and for the intrusion of private interests too far into public interest sector research. Until now, the economic and political domination of the agricultural development agenda by MNCs has thrived at the expense of the interests of consumers, farm workers, small family farms, wildlife and the environment.

It is urgent for civil society to have earlier entry points and broader participation in technological decisions so that the domination of scientific research by corporate interests is dealt with more stringent public control. National and international public organizations such as FAO, CGIAR, etc., will have to carefully monitor and control the provision of applied non proprietary knowledge to the private sector so as to protect that such knowledge will continue in the public domain for the benefit of rural societies. Publicly controlled regulatory regimes must be developed and employed for assessing and monitoring the environmental and social risks of biotechnological products (Webber 1990).

Finally, the trends towards a reductionist view of nature and agriculture set in motion by contemporary biotechnology must be reversed by a more holistic approach to agriculture, so as to ensure that agroecological alternatives are not foregone and that only ecologically-sound aspects of biotechnology are researched and developed. The time has come to counter effectively the challenge, and the reality, of genetic engineering. As it has been with pesticides, biotechnology companies must feel the impact of environmental, farm labor, animal rights and consumers lobbies, so that they start re-orienting their work for the overall benefit of society and nature. The future of biotechnology based research will be determined by power relations, and there is no reason why farmers and the public in general, if sufficiently empowered, could not influence the direction of biotechnology along sustainability goals.

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A. Warnings from Scientists

Russian scientists : GM Soy as feed for animals affects posterity

*Dr. Irina Ermakova and Dr. Alexander Baranoff **

1. A Russian study sponsored by the National Association of Genetic Safety, Moscow and jointly conducted by Dr. Alexey Surov, Institute of Ecology and Evolution Russian Academy of Sciences, Moscow, and Dr. Alexander Baranoff , N. Kol'tsov's Institute of Developmental Biology in Moscow, was undertaken from August 2008 to May 2010 to determine the effects of GM Soy (Roundup Ready, line 40.3.2) as feed for farm animals.

The experiment was carried out on Campbell's hamsters (*Phodopus campbelli*) over a period of two years and three generations.

The results for the GM Soy fed group of animals indicated:

- slower growth and development;
- disturbance of the reproductive system in both male and female animals
- a number of third generation animals were sterile
- a reduced number of offspring
- an increased number of female offspring
- the formation of 'hair brush' in the oral cavity of some animals

Conclusion: The feed containing GM soy (line 40.3.2), has a significant effect on reproduction, ontogenesis and common biological parameters of mammals.

These results underline the imperative for additional independent studies to be carried out on the effects of GM soy products in our food.

2. On October 10 2010, at the symposium on genetic modification organized by the Russian National Association for Genetic Security (NAGS), Doctor of Biology **Irina Ermakova** made public the results of the research led by her at the Institute of Higher Nervous Activity and Neurophysiology of the Russian Academy of Sciences (RAS). The research determined clear dependence between eating genetically modified soy and the posterity of living creatures.

During the experiment, Dr. Ermakova added GM soy flour, (Roundup Ready, RR), 5-7 g for each rat, to the food of female rats (Wistar rats) two weeks before conception, during conception and nursing. The control group did not have added anything to their food. The experiment was formed by 3 groups of 3 female rats in each: the first one was the control group, the second one was the group with GM-soy addition, and the third one with traditional soy addition. The scientists counted the number of female animals that gave birth, the number of puts that were born and the number of pups that died.

Subsequently during the second stage of the experiment, the rats were divided into two groups – one with GM-soy added in their food, and the other without the GM-soy. In three weeks the experiment

revealed the following results:

Results

Groups	Females that gave birth	Newborn rats	Dead rats (within three weeks)	Percent of dead rats
Control group	4 (of 6)	44	3	6,8%
With GM-soy	**4 (of 6)**	**45**	**25**	**55,6%**
With normal soy	3 (of 3)	33	3	9%

Distribution of weight of rat kids in both series (in %)

Groups	Control	**GM-soya**	Traditional soya
50-40 g	12,5%	0%	0%
40-30 g	37,5%	23%	20%
30-20 g	44%	41%	73,3%
20-10 g	6%	**36%**	6,7%

Conclusion:

- A high mortality, ~ 55,6%, of first generation rat kids after addition of GM-soy (Roundup Ready, RR) into the diet of rat females (before pregnancy, during pregnancy and during lactation) was revealed.
- The weight of 36% of rat kids, whose mothers were fed GM-soya, was less than 20 grammes two weeks after birth in comparison with control group and group "traditional soya" (6% and 6,7% accordingly).

"The morphology and biochemical structures of rats are very similar to those of humans, and this makes the results we obtained very disturbing," said Irina Ermakova to the NAGS press office. According to NAGS Vice-president **Aleksey Kulikov**, the data received by Dr. Ermakova confirm the necessity of full scale tests of GM-products' influence over living creatures.

http://www.regnum.ru/english/nags

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A. Warnings from Scientists

Pesticide Treadmill : The Rise of Super Weeds

*Bill Freese, Center for Food Safety**

Monsanto's Roundup Ready (RR) soybeans, corn, cotton, and canola dominate the world of biotech agriculture, occupying five of every six acres of genetically engineered (GE) crops grown worldwide.[104] RR crops are engineered to withstand direct application of glyphosate, the active ingredient in Monsanto's Roundup and other brands of glyphosate herbicide.

Roundup Ready crops facilitate season-long use of glyphosate for weed control, and are largely responsible for a ten-fold increase in agricultural use of the herbicide in the U.S. from 1993 to 2007.[105] At 200 million pounds per year in the U.S. alone (2007), [106] glyphosate is the most heavily used pesticide the world has ever seen. Large quantities of glyphosate are also used in Argentina, Brazil, Paraguay, and other countries where RR crops are prevalent. While RR crops are presently found mainly in North and South America, Monsanto is rapidly introducing them in many developing countries. Roundup Ready corn has been grown in South Africa since 2005,[107] while Monsanto's Indian partner, Mahyco, is poised to introduce stacked cotton hybrids with both RR and insect resistance (Bt) genetic traits in India.[108]

This massive use of glyphosate is bad news for several reasons. First, glyphosate formulations are clearly harmful to the environment and may pose human health risks as well. Second, a growing body of research shows that glyphosate has adverse agricultural impacts by drifting during application to damage neighboring non-RR crops, and may also make RR crops more susceptible to disease. Most importantly, heavy glyphosate use with RR crops has triggered an epidemic of glyphosate-resistant weeds. These resistant weeds are driving a toxic spiral of increased herbicide use, which will be exacerbated by the imminent introduction of a new generation of GE crops resistant to even more toxic herbicides – crops that the pesticide-biotech industry is marketing as the supposed "solution" to glyphosate-resistant weeds.

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104 ISAAA (2009). "Global Status of Commercialized Biotech/GM Crops: 2009 - The first fourteen years, 1996 to 2009." Of 134 million ha of GM crops, 62.4% (83.6 mill. ha) are herbicide-resistant (HR) alone; 21.4% (28.7 mill. ha) are stacked crops with HR and insect-resistance traits; 62.4 + 21.4 = 83.8% with herbicide resistance, virtually all Roundup Ready. ISAAA is the International Service for Acquisition of Agribiotech Applications, an organization funded by the biotechnology industry to spread misinformation about GM crops. Friends of the Earth International and Center for Food Safety have published several reports debunking ISAAA misinformation. For example, see: http://www.centerforfoodsafety.org/2008/02/13/genetically-modified-gm-crops-increase- pesticide-use-and-fail-to-alleviate-poverty-reveals-new-report/. Unfortunately, we know of no other source for world figures on biotech crop adoption.

105 U.S. Environmental Protection Agency, "Pesticides Industry Sales and Usage: Market Estimates" – see reports for 1998/1999 and 2006/2007, Table 3.6 in each report, http://www.epa.gov/opp00001/pestsales/. Agricultural use of glyphosate rose from 15-20 million lbs. in 1993 to 180-185 million lbs. in 2007.

106 Ibid, 2006/2007 report. Agricultural use (180-185 million lbs) + home/garden use (5-8 million) + industrial/government/commercial use (13-15 million) = 198-208 million lbs. total (Tables 3.6 to 3.8).

107 http://www.monsantoblog.com/2009/04/02/gm-corn-in-south-africa/.

108 Damodaran, H. (2011). "India to plant first herbicide-tolerant GM crop," *Hindu Business Line*, March 6, 2011. http://www.thehindubusinessline.com/industry-and-economy/article1514862.ece.

Epidemiological studies of farmers have shown an association between contact with glyphosate herbicides and higher rates of certain cancers – non-Hodgkin's lymphoma, hairy cell leukemia[109] and multiple myeloma.[110] While not definitive, these associations deserve serious consideration because they involve glyphosate as it is used in the real world. They cast serious doubt on the U.S. Environmental Protection Agency's (EPA) opinion – based on laboratory experiments on glyphosate as an individual ingredient alone – that there is no evidence the herbicide is carcinogenic. But in many cases, the toxicity of these formulations is attributable more to "inert" ingredients that are added to make glyphosate more effective.

Laboratory research conducted by French scientists has shown that Roundup and a commonly added "inert" ingredient – POEA – are lethal to placental and various other human cell lines.[111] Glyphosate has also been shown to inhibit synthesis of sex hormones.[112] An Argentine study involving injection of glyphosate into frog embryos resulted in young frogs with cranial abnormalities. Further research is needed to determine whether these effects detected in lab tests represent real-world risks.

Additional studies have shown that glyphosate formulations containing the common supposedly "inert" ingredient POEA are quite toxic at levels as low as 0.8 parts per million to many different frog species.[113] Concentrations approaching this magnitude can be found in pools where frogs spawn in areas where glyphosate is sprayed, leading researchers to suggest that glyphosate may be one factor in declining amphibian populations.[114] The U.S. EPA has stated that glyphosate use may especially harm two endangered amphibian species: the California red-legged frog[115] and the Houston toad.[116]

Two recent studies implicate glyphosate as one of several factors responsible for declining Monarch butterfly populations. Heavy glyphosate use with RR crops has decimated populations of milkweed, the Monarch's favorite host plant, in agricultural fields in Iowa. This results in a decrease in Monarch

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[109] Hardell, L., & Eriksson, M. (1999). "A Case-Controlled Study of Non-Hodgkin's Lymphoma and Exposure to Pesticides," *Cancer*, 85(6), 1353–1360; Hardell L, Eriksson M, & Nordstrom M. (2002). "Exposure to pesticides as risk factor for non-Hodgkin's lymphoma and hairy cell leukemia: pooled analysis of two Swedish case-control studies," *Leuk Lymphoma*, 43(5), 1043-1049; De Roos, et al. (2003). "Integrative assessment of multiple pesticides as risk factors for non-Hodgkin's lymphoma among men," *Occup Environ Med*, 60(9);

[110] De Roos, A. J. D., Blair, A., Rusiecki, J. A., Hoppin, J. A., Svec, M., Dosemeci, M., Sandler, D. P., & Alavanja, MC (2005). Cancer Incidence among Glyphosate-Exposed Pesticide Applicators in the Agricultural Health Study. *Environmental Health Perspectives*, 113(1), 49-54.

[111] Benachour, N., & Seralini, G.-E. (2008). Glyphosate Formulations Induce Apoptosis and Necrosis in Human Umbilical, Embryonic, and Placental Cells. *Chemical Research in Toxicology*, 22(1), 97-105.

[112] Walsh, L. P., McCormick, C., Martin, C., & Stocco, D. M. (2000). Roundup Inhibits Steroidogenesis by Disrupting Steroidogenic Acute Regulatory (StAR) Protein Expression. *Environ Health Perspect*, 108, 769– 776.

[113] Relyea RA, Jones DK (2009) The toxicity of Roundup Original MAX® to 13 species of larval amphibians. Environ Toxicol Chem 28:2004-2008.

[114] Relyea, R.A. (2005). "The lethal impact of Roundup on aquatic and terrestial amphibians," *Ecological Applications* 15(4): 1118–1124.

[115] Carey S, Crk T, Flaherty C, Hurley P, Hetrick J, Moore K, Termes SC (2008) Risks of glyphosate use to federally threatened California red-legged frog (*Rana aurora draytonii*). US EPA, Washington, DC.

[116] EPA (1993). "Reregistration Eligibility Decision: Glyphosate," Environmental Protection Agency, Sept. 1993, p. 56.

breeding habitat.[117] This research highlights the fact that glyphosate is quite toxic to nearly all species of plants. Thus, it is entirely conceivable that glyphosate is reducing populations of many other plant species growing near agricultural fields, and adversely impacting the organisms that depend on those plants. Indeed, glyphosate has been cited as a threat to several species of endangered plants, and would also threaten any organisms (such as the larval stage of butterflies) that depend on these plants as a food source.

Contamination and Disease

Glyphosate-based herbicides are also prone to drift, especially when sprayed by airplane, and are responsible for many episodes of damage to neighboring non-RR crops.[118] In fact, some farmers have started growing RR crops to defend themselves against drift and misapplication.[119] Additionally, research has found that glyphosate is exuded from the roots of RR plants,[120] where it fosters the growth of disease-causing fungi and kills off beneficial bacteria that help the plant absorb essential nutrients such as manganese.[121] These studies suggest that glyphosate may make RR plants more prone to disease and less nutritious.

Super-Weeds

Massive use of RR pesticide is responsible for the vast majority of glyphosate-resistant (GR) weeds, which were virtually unknown prior to the introduction of RR crops. Glyphosate-resistant weeds have reached epidemic proportions in the United States, where they infest over ten million acres,[122] and are also becoming threats in the huge RR soybean plantations of Argentina, Brazil and Paraguay.[123] The National Academy of Sciences recently noted that farmers respond to GR weeds by increasing their use of glyphosate and/or other herbicides, and also by resorting to more tillage operations to physically remove weeds,[124] which increases soil erosion. North Carolina weed scientist Alan York has called glyphosate-resistant pigweed a threat to cotton production on the order of infamous boll weevil.[125] In 2009 in Georgia, half a million acres of cotton (200,000 hectares) were weeded by hand to remove GR

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[117] Hartzler, R.G. (2010). "Reduction in common milkweed (*Asclepias syriaca*) occurrence in Iowa cropland from 1999 to 2009," Crop Protection 29: 1542-1544; Brower, L.P. et al (2011). "Decline of Monarch butterflies overwintering in Mexico: is the migratory phenomenon at risk?" Insect Conservation and Diversity, DOI: 10.1111/j.1752-4598.2011.00142.x.

[118] Lee, E.H. et al (2005). "GIS-based risk assessment of pesticide drift case study: Fresno County, CA," EPA/600/R-05/029, Environmental Protection Agency, March 2005.

[119] Baldwin, F.L. (2010). "Herbicide drift damaging rice," Delta Farm Press, June 7, 2010. http://deltafarmpress.com/rice/herbicide-drift-damaging-rice-0607/.

[120] Motavalli, P.P. et al. (2004). "Impact of genetically modified crops and their management on soil microbially mediated plant nutrient transformations," *J. Environ. Qual.* 33:816-824.

[121] Kremer, R.J & Means, N.E. (2009). "Glyphosate and glyphosate-resistant crop interactions with rhizosphere microorganisms," *European Journal of Agronomy* 31: 153-161.

[122] USDA APHIS (2010). "Draft environmental assessment of supplemental request for partial deregulation of sugar beet genetically engineered to be tolerant to the herbicide glyphosate," USDA Animal and Plant Health Inspection Service, October 2010, p. 93.

[123] Binimelis, R. et al (2009). "'Transgenic treadmill': Responses to the emergence and spread of glyphosate-resistant johnsongrass in Argentina," Geoforum 40: 623-633. See also: http://www.weedscience.org/Summary/UspeciesMOA.asp?lstMOAID=12&FmHRACGroup=Go.

[124] NRC (2010). *The Impact of Genetically Engineered Crops on Farm Sustainability in the United States,* National Research Council, National Academy of Sciences, 2010 (pre-publication copy), p. 2-15.

[125] Minor, E. (2006). "Herbicide-resistant weed worries farmers," Associated Press, December 18, 2006.

pigweed, raising weed control costs from $25 to $60-100/acre. Georgia weed scientist Stanley Culpepper believes these astronomical costs will likely drive some of his state's cotton growers out of business.[126]

This problem is not only present among cotton fields in the South. GR weeds have become a major threat in the Midwest as well, where they infest soybeans and corn. And they are rapidly spreading north to Minnesota and even Canada.

GR horseweed infests millions of acres in the United States, and drives farmers to abandon conservation tillage practices. Common waterhemp, a pigweed relative, is particularly feared because it has shown an uncanny ability to evolve resistance not only to glyphosate, but several other herbicides as well.

Hundreds of thousands of acres are infested with waterhemp resistant to glyphosate and two other herbicides in Missouri. University of Illinois weed scientists fear that "quad-resistant" waterhemp is on the verge of becoming an unmanageable problem that could soon make growing soybeans "impractical" in many Midwestern fields.[127]

The industry has a "fix" to GR weeds, of course, and as one might expect it involves still greater chemical dependence. All of the big pesticide-biotech firms are spending hundreds of millions of dollars to develop new crops resistant to more toxic herbicides in order to more easily kill glyphosate-resistant weeds.[128] Dow AgroSciences is awaiting U.S. Dept. of Agriculture approval of corn and soybeans resistant to 2,4-D, one component of the dioxin-laced Agent Orange defoliant used in the Vietnam War.[129] 2,4-D is a probable human carcinogen as well as an endocrine disruptor.[130]

Monsanto awaits approval of soybeans resistant to dicamba, a close chemical cousin of 2,4-D, and is also developing dicamba-resistant corn and cotton.[131] Dicamba is highly volatile, and frequently becomes airborne and drifts to neighboring crops where it causes damage.[132] Some studies suggest dicamba may be carcinogenic;[133] some suggest that it may have reproductive toxicity traits when used in

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[126] Haire, B. (2010). "Pigweed threatens Georgia cotton industry," Southeast Farm Press, July 6, 2010. http://southeastfarmpress.com/cotton/pigweed-threatens-georgia-cotton-industry-0706/.

[127] Tranel, P.J. (2010). "Herbicide resistances in Amaranthus tuberculatus: A call for new options," Journal of Agricultural and Food Chemistry, DOI:10.1021/jf103797n.

[128] Kilman, S. (2010). "Superweed outbreak triggers arms race," Wall Street Journal, June 4, 2010.

[129] See Petition Nos. 09-349-01p & 09-233-01p at http://www.aphis.usda.gov/biotechnology/not_reg.html.

[130] For documented review of 2,4-D's adverse health impacts, see Comments to EPA on its 2,4-D Risk Assessment, Docket ID No OPP-2004-0167, submitted by a coalition of public health groups, including NRDC and Beyond Pesticides, August 23, 2004.

[131] See Petition No. 10-188-01p at http://www.aphis.usda.gov/biotechnology/not_reg.html. For dicamba-resistant cotton and corn, see: Monsanto (2010b). "Monsanto Announces Record 11 Project Advancements in Annual Research and Development Pipeline Update," News Release, Jan 6, 2010. http://monsanto.mediaroom.com/index.php?s=43&item=788.

[132] See testimony of Steve Smith before the Domestic Policy Subcommittee of the House Committee on Oversight and Government Reform, Sept. 30, 2010, at http://oversight.house.gov/index.php?option=com_content&view=article&id=984%3A09-30-2010-domestic-policy-are-superweeds-an-outgrowth-of-usda-biotech-policy-part-ii&catid=18%3Asubcommittee-on-regulatory-affairs&Itemid=1.

[133] Cantor, K.P. (1992). "Pesticides and other agricultural risk factors for non-Hodgkin's lymphoma among men in Iowa and Minnesota," *Cancer Res.* 52: 2447-2455; Samanic, C. et al (2006). "Cancer Incidence among Pesticide Applicators Exposed to Dicamba in the Agricultural Health Study," *Environmental Health Perspectives* 114: 1521-1526.

combination with other herbicides.[134] These crops will become "stacked" with resistance to glyphosate and often additional herbicides, permitting them to be doused with multiple weed-killers, and increasing herbicide residues on these crops. Genes conferring resistance to most major classes of herbicide, including the neurotoxin paraquat, have been identified, and await introduction into a wide variety of crops.[135] Monsanto and Dow are already selling SmartStax corn that withstands application of both glyphosate and glufosinate pesticides.*What the Future Holds*

None of this should surprise us. After all, biotechnology companies are actually pesticide firms that have purchased a considerable share of the world's commercial seed supply.[136] They have hit upon a winning formula – use genetic engineering to create herbicide-resistant (HR) seeds that in turn drive greater use of their herbicides. Dow scientist John Jachetta can barely contain his excitement. He foresees "a new era" dawning, one that will create "a very significant opportunity" for chemical companies to sell more of their product.[137] When one considers that 2.1 billion pounds of weed-killing chemicals were used in 2007 (40 percent of world pesticide use, far higher than insecticides),[138] the excitement becomes understandable.

Another critical aspect is that HR crops do more than give a short-term boost to herbicide sales. They promise a future of greater pesticide dependence, and a sustained, long-term increase in toxic herbicide use. This is because HR crops have proven to be a remarkably effective means to speed up the evolution of resistant weeds, as demonstrated by Roundup Ready technology. As weeds evolve resistance to ever more herbicides (e.g. the "quad-resistant" waterhemp noted above), farmers will find themselves swept up in a toxic spiral of increasing weed resistance and rising use of multiple herbicides.[139] As one harbinger of the future, consider that biotech giant DuPont-Pioneer has obtained a patent that envisions a single plant resistant to seven or more different families of herbicide.[140] (Similar patents have been awarded to other firms.) Clearly, companies would not be investing in development of such super herbicide-resistant crops – there would be no need for them – if they did not foresee a profitable future of multiple HR superweeds.

It's long past time that well-meaning biotechnology supporters wake up from their dreams of miracle GE crops that will supposedly cure all manner of world problems, and face up to the cold, hard facts.

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[140] "Novel Glyphosate-N-Acetyltransferase (GAT) Genes," U.S. Patent Application Publication, Pub. No. US 2009/0011938 A1, January 8, 2009, paragraph 33.

World hunger is on the rise, despite massive adoption of GE soybeans, corn and cotton.[141] GE crops do not increase yield.[142] Most have led to increasing chemical dependence. Even their one advantage – more convenient, labor-saving weed control (for those not yet plagued by resistant weeds) – is a double-edged sword, because it facilitates the worldwide trend to consolidate farmland into ever bigger farms. Even if these crops were appropriate, most small farmers in developing countries cannot afford expensive GE seeds and their companion herbicides. These highly publicized "poster-child" GE crops are yet somehow never perfected, and biotech companies are leading agriculture ever further from sustainable solutions without solving any of the world's food problems.

Fortunately, momentum is building for a radical new approach to tackle world hunger. Low-cost, agroecological techniques to increase food production have been proven in the field and are already helping small farmers better provide for their families and communities.[143] Rather than pack "technology" into seed via biotechnology, agroecology engages farmers' knowledge and skills. For example, the push-pull system of maize cultivation – practiced by 30,000 farmers in East Africa – employs innovative intercropping that controls insect pests and weeds and enriches the soil, thereby increasing production without chemical inputs. Agroforestry employs nitrogen-fixing trees to improve soil fertility and provide a source of firewood.[144] With financial support and political will, these and dozens of other successful innovations could be scaled up to benefit many more farmers.

World hunger is not a looming future menace as it is so often portrayed by companies intent on selling the world their expensive technologies. It is a reality being lived each and every day by a billion human beings. It's time to get serious about hunger. And that means redirecting energies from misleading and harmful biotech experiments to real-world solutions that can tackle hunger now.

***Bill Freese,** *science policy analyst at the Center for Food Safety (CFS) since 2006. In his six years with the Safer Food – Safer Farms campaign at Friends of the Earth, he played a key role in the discovery of unapproved StarLink corn in the food supply in 2000/01 and authored numerous reports and comments to government agencies concerning the science and regulation of genetically engineered crops. In 2004, he teamed up with Salk Institute cell biologist David Schubert to write a comprehensive, peer-reviewed scientific critique of the regulation and safety testing of GE foods.*

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A. Warnings from Scientists

Why we don't need GMOs

Dr. Hans R Herren, President Millennium Institute, Co-Chair IAASTD

The one thing that would help humanity a great deal would be to learn from past mistakes. This seems however very difficult, as can be seen by the many major problems the world is facing on a daily bases.
A particular case in point can be found in the agriculture sector, where now some 60 years ago, there was a general recognition that the growing pesticide use was leading into a treadmill, eventually forcing farmer to abandon their fields, as was the case for cotton production in Peru. In other instances, the problem may not have reached these dramatic proportions, but lead to a constant increase of quantity of spays used as well as to the use of increasingly more toxic pesticides.

The problem then? Farmers were treating the symptoms, advised by eager pesticide sales persons, disguised as extension officers. So, concerned scientists invented Integrated Pest Management, based on the premise that if the (agro-eco) system is managed well, there would be no need for pesticides, perhaps except when there are pest outbreaks such as locusts or other migratory and invasive pests. IPM was a well defined strategy, that was based on sound agronomic practices, crop diversity and rotation, natural control mechanisms, host plant tolerance and only in exceptional cases the use of external products, and when these are needed they were to be of biological origin or when synthetic be of low toxicity, very specific to the target pest.

Did it work? Yes for a while, until the agribusiness "adopted" the strategy and placed the pesticide part upfront, developing phony damage threshold, to incite farmers to spray, even thought the pest population was not at any threatening level. So a good idea that was corrupted by simple greed.
When it comes to GMOs, farmers are now being coerced into a similar pattern of symptom treatment, which has now already shown its many shortcomings such as resistance build up from weeds to pest insects and the need to reach to ever new GMO varieties, with stacked resistance genes.

The treadmill is on, and so the cash register of the agribusiness. Greed again, at the costs of the farmers, the consumers and the environment. It is well known and documented that GMOs have a disruptive effect of the natural pest control mechanisms, that they do impact plant health (without, by the way increasing yields substantially or in ways that could not be achieved by better agronomy for example). Wherever GMOs are being deployed, the varieties offered to the farmers have been reduced, in some place to the level of only GMOs being available.

When it comes to resilience to climate change, its not the much heralded "climate ready" crop varieties that will provide the relief the farmers need, its healthy soils, soils that are able to absorb water and release it when needed by the ever growing weather extremes. Furthermore the claim that we need to

double the food production to feed the world is yet another sales gimmick of the GMO industry. Today we already produce 4600 Kcal per person, that would in principle be enough for twice the present population.

The International Assessment for Agricultural Knowledge Science and Technology for Development (IAASTD) made the point already back in 2009 in its report series "Agriculture at a Crossroads". There is a need for a new paradigm, a shift in the way we grow, process and consume food. We need to start talking about nourishing people rather than feeding people, we need to allow farmers around the world to produce for the local needs, so to reduce waste, transport costs and allow them an option for income. The nexus of hunger and poverty is real, and it's not with large scale, fertilizer and other heavy energy use in a few countries that we will resolve the hunger/poverty and sustainable development problem.

There are many sign on the wall already that tell us we are on the wrong path with GMO based agriculture, an agriculture that promotes the industrialized, fossil energy based and mono-crop based model that we need to leave behind and move on the agroecological farming practices, that are in sync with the people, the environment and the economy. But not the greed based economy, rather an economy that is concentrated on dealing with the inequity and one whose growth is not at the expense of the future, by consuming shrinking natural capital, but rather by increasing it, along with the human capital.

GMOs are simply not needed in such a world. Lets learn from the past and build a better future for all. This will take strong and determined efforts, not the least in view of the immense investments that are made into genetic engineering by Foundations (B&M Gates), who now also want to prescribe what is good for the world, by investing massively in the biotech industry (Monsanto) and research (Danford Plant Science Center, both based in St Louis, Missouri).

The time to unite the efforts for the implementation the new agriculture paradigm that the IAASTD had put forward is NOW.

Hans Herren, *internationallly recognized scientist. President of the Millenium Institute whose mission is to enhance insight for decision-making in complex systems towards the development of a global sense of shared responsibility about our common future and works on integrated sustainable development issues, in particular, linking environmental, plant, animal, and human health issues.*
He was Co-Chair of the seminal report International Assessment of Agricultural Knowledge, Science and Technology (IAASTD). www.millennium-institute.org/

A. Warnings from Scientists

Scientists Discover New Route for GM-gene "Escape"

*Dr. Mae-Wan Ho, Institute of Science in Society**

Gene "escape" a misnomer for horizontal gene transfer

Scientists at Bristol University in the UK announced the discovery of [1] "a previously unknown route" whereby "GM genes may escape into the natural environment." "Escape" is a misnomer. There is no need for the GM (genetically modified) genes to "escape", when genetically modified organisms (GMOs) have been released in great abundance into the environment over the past 17 years. At issue is how fast and how widely the GM genes can *spread*, and what dire consequences could arise.

The "escape" referred to is horizontal gene transfer – the spread of GM genes by infection and multiplication (literally like a virus) regardless of species barriers; hence the rate of spread is much more rapid, and the extent virtually unlimited. New combinations of genetic material are created at unprecedented speed, affecting species the most that reproduce the fastest, i.e., bacteria and viruses that cause diseases. Horizontal gene transfer and recombination is indeed a main route for generating new strains of bacteria and viruses that cause diseases. Genetic modification and release of GMOs into the environment is greatly facilitating this horizontal gene transfer and recombination. It has created highways for gene trafficking in place of the narrow by-ways and occasional footpaths that previously existed in nature.

Some of us have long considered horizontal gene transfer to be *the* most serious hidden and underestimated hazard of genetic engineering, and have alerted regulators accordingly, time and again, since GMOs were first released (see for example [3, 4] (Gene Technology and Gene Ecology of Infectious Diseases, ISIS scientific publication; Genetic Engineering Dream or Nightmare, ISIS publication). The recent "emergency" warning sent by a senior US Department of Agriculture scientist to the US Secretary of Agriculture on a suspected pathogen "new to science" associated with GM crops may prove to be a case in point [5] (Emergency! Pathogen New to Science Found in Roundup Ready GM Crops? *SiS* 50).

Plant wounds hotspots for gene trafficking

The researchers at Bristol University showed that plant wounds, that could be created by insect bites, abrasion, and other mechanical damage, are hotspots for gene trafficking due to the wound hormones produced by the plant. Under such circumstances, the soil bacterium *Agrobacterium tumefaciens,* which causes crown gall disease in plants, could enlarge its host range to infect fungi, and insert foreign genes into the fungi's genome [2]. This has large implications on the safety of GMOs already widely released into the environment.

A. tumefaciens is probably unique among natural plant pathogens in carrying out trans-Kingdom horizontal gene transfer during an infection, and it is this ability that has been widely exploited for creating GM crops, grown on an estimated 134 million hectares worldwide in 2009, 0, according to industry-funded International Service for the Acquisition of Agri-biotech Applications (ISAAA) [6].
Research commissioned by the UK Department of the Environment, Food and Rural Affairs (DEFRA) in the 1990s had already revealed that it is very difficult, if not impossible to get rid of the *Agrobacterium* vector used in creating the transgenic plant [7], and the bacterium is likely to remain dormant even after the transgenic plants are transplanted into the soil. Hence, it is expected to facilitate horizontal gene transfer, in the first instance, to wild-type *Agrobacterium* in the soil, and further afield.
Disease-causing strains *of A. tumefaciens* have an extrachromosomal Ti (tumour-inducing) plasmid that enables the horizontal transfer of a segment of the Ti plasmid, the Transfer-DNA (T-DNA), into the plant cell genome when the bacterium's virulence (disease causing) system is activated by hormones produced by the wounded plant. This feature is exploited in creating genetically modified organisms (GMOs), by disarming the bacterium, and incorporating the virulence genes in a 'binary' vector that has to be used in conjunction with the disarmed *Agrobacterium* strain.
In the 1990s, it was shown that the range of organisms transformed by *Agrobacterium* could be extended if the wound hormone acetosyringone was used to induce the virulence system.

The researchers at Bristol University reasoned that as *A. tumefaciens* is a soil-dwelling pathogen that often infects plants through wounds, it is conceivable that the bacterium could encounter numerous species of microorganisms, including pathogenic fungi that the same method to gain entry into the plant. The wound sites are likely to be exuding wound hormones such as acetosyringone, so the bacteria are primed for T-DNA transfer.

Research commissioned by the UK Department of the Environment, Food and Rural Affairs (DEFRA) in the 1990s had already revealed that it is very difficult, if not impossible to get rid of the *Agrobacterium* vector used in creating the transgenic plant [7], and the bacterium is likely to remain dormant even after the transgenic plants are transplanted into the soil. Hence, it is expected to facilitate horizontal gene transfer, in the first instance, to wild-type *Agrobacterium* in the soil, and further afield.

Experiments confirmed their suspicion in full
They carried out their investigation using the wilt-causing fungus *Verticillium albo-atrum*, a strong candidate for encounters with *Agrobacterium* in the plant, as it has a similar wide host range in plants, infecting both root and crown. Previous lab experiments have shown that *V. albo-atrum* cannot be transformed by *Agrobacterium* in the absence of acetosyringone. So, if it is presented with *Agrobacterium* on plant tissue, and transformation does occur, it must be the plant that supplies the wound hormone.

Peeled and sliced potato tubers and carrots, leaf- and stem-sections from tobacco plants were used as the plant tissues for testing. After sterilization, they were inoculated with both *A. tumefaciens* and *V. albo-atrum* and left at room temperature in a covered agar dish for a minimum of 8 days and a maximum of 42 days.

Successful transformants of *V. albo-atrum* were obtained from every kind of plant tissue. 2 out of 17 potato slices, 1 out of 15 carrot slices; 14 out of 42 dishes each with 3-5 leaf pieces, and 10 out of 31 stem sections (without agar plate, so as to be as close to the natural condition as possible). These transformants were confirmed with molecular genetic analyses.

Implications of GMO risk assessment results still understated

The researchers concluded [2]: "This work therefore raises interesting questions about whether the host range of *A. tumefaciens* in nature is greater than just plants. It is possible that evidence of such events could be looked for retrospectively in the increasing number of genome sequences becoming available....

"In addition, the result may well have implications for the risk assessment of GM plants generated via *Agrobacterium*-mediated transformation, as *Agrobacterium* can survive within plant tissue through transformation and tissue culture and can therefore be found within regenerated transgenic plants..."

This is an understatement of a serious risk that has been known almost since the first release of *Agrobacterium*-transformed GMOs into the environment.

The risks are far greater than admitted

We have repeatedly drawn attention to the possibility of facilitated horizontal gene transfer from GMOs created with *Agrobacterium* vector, which is even stronger than originally envisaged due to other discoveries made since then. I reproduce what we wrote in 2008 [8] (Horizontal Gene Transfer from GMOs Does Happen, *SiS* 38), which repeats an earlier account [9] (Living with the Fluid Genome, ISIS publication) (see Box).

***Agrobacterium* vector a vehicle for facilitated horizontal gene transfer** [8, 9]

"We have ..provided evidence strongly suggesting that the most common method of creating transgenic plants may also serve as a ready route for horizontal gene transfer [9, 10].

"Agrobacterium tumefaciens, the soil bacterium that causes crown gall disease, has been developed as a major gene transfer vector for making transgenic plants. Foreign genes are typically spliced into the T-DNA - part of a plasmid of *A. tumefaciens* called Ti (tumour-inducing) – which ends up integrated into the genome of the plant cell that subsequently develops into a tumour.

"But further investigations revealed that the process whereby *Agrobacterium* injects T-DNA into plant cells strongly resembles *conjugation*, the mating process between bacterial cells.

Conjugation, mediated by certain bacterial plasmids requires a sequence called the origin of transfer (*oriT*) on the DNA that's transferred. All the other functions can be supplied from unlinked sources, referred to as 'trans-acting functions' (or *tra*). Thus, 'disabled' plasmids, with no trans-acting functions, can nevertheless be transferred by 'helper' plasmids that carry genes coding for the trans-acting functions. And that's the basis of a complicated vector system devised, involving *Agrobacterium* T-DNA, which has been used for creating numerous transgenic plants.

"It soon transpired that the left and right borders of the T-DNA are similar to *oriT*, and can be replaced by it. Furthermore, the disarmed T-DNA, lacking the trans-acting functions (*virulence* genes that contribute to disease), can be helped by similar genes belonging to many other pathogenic bacteria. It seems that the trans-kingdom gene transfer of *Agrobacterium* and the conjugative systems of bacteria are both involved in transporting macromolecules, not just DNA but also protein.

"That means transgenic plants created by the T-DNA vector system have a ready route for horizontal gene escape, via *Agrobacterium*, helped by the ordinary conjugative mechanisms of many other bacteria that cause diseases, which are present in the environment.

"In fact, the possibility that *Agrobacterium* can serve as a vehicle for horizontal gene escape was first raised in 1997 in a study sponsored by the UK Government [7, 12], which found it extremely difficult to get rid of the *Agrobacterium* in the vector system after transformation. Treatment with an armory of antibiotics and repeated subculture of the transgenic plants over 13 months failed to get rid of the bacterium. Furthermore, 12.5 percent of the *Agrobacterium* remaining still contained the binary vector (T-DNA and helper plasmid), and *were hence fully capable of transforming other plants*.

"Agrobacterium not only transfers genes into plant cells; there is possibility for *retro*transfer of DNA *from* the plant cell *to Agrobacterium* [13]. High rates of gene transfer are associated with the plant root system and the germinating seed, where conjugation is most likely [14]. There, *Agrobacterium* could multiply and transfer transgenic DNA to other bacteria, as well as to the next crop to be planted. These possibilities have yet to be investigated empirically.

"Finally, *Agrobacterium* attaches to and genetically transforms several human cell lines [15, 16] (Common plant vector injects genes into human cells *ISIS News* 11/12). In stably transformed HeLa cells (a human cell line derived originally from a cancer patient), the integration of *T-DNA* occurred at the right border, exactly as would happen when it is transferred into a plant cell genome. This suggests that *Agrobacterium* transforms human cells by a mechanism similar to that which it uses for transforming plants cells.

"The possibility that *Agrobacterium* is a vehicle for horizontal transfer of transgenic DNA remains unresolved to this day."

Agrobacterium transfers genes into human cells

It is also worth reiterating our comment on the scientific paper [15] documenting that *Agrobacterium* can transfer genes into human cells [16].

"The paper shows that human cancer cells along with neurons and kidney cells were transformed with the *Agrobacterium* T-DNA. Such observations should raise alarm for those who use *Agrobacterium* in the laboratory.

"The integrated T-DNA will almost certainly act as a mutagen as it integrates into human chromosomes. Cancer can be triggered by activation of oncogenes (cancer genes) or inactivation of cancer-suppressing genes. Furthermore, the sequences carried within the T-DNA in the transforming bacterium can be expressed in the transformed cells (the viral promoter CaMV has been found to be active in HeLa cells [17]) ….

"It is clear that little has been done to prevent environmental escape of the transforming bacteria or to quantify such releases. In conclusion, a study of cancer incidence among those exposed to *Agrobacterium tumefaciens* in the laboratory and in the field is needed. It would be worthwhile to screen workers for T-DNA sequences."

To conclude, the discovery by the Bristol University researchers barely scratches the surface of the hidden hazards of GMOs from horizontal gene transfer. It is high time for a global ban to be imposed on further environmental releases of GMOs.

*** *Mae Wan Ho***, *geneticist and founder and Director of the Institute of Science in Society. The Institute's aim is the promotion of critical public understanding of science and to engage both scientists and the public in open debate and discussion. She has authored or co-authored a number of publications, including 10 books, such as The Rainbow and the Worm, the Physics of Organisms (1993, 1998), Genetic Engineering: Dream or Nightmare? (1998, 1999), and Living with the Fluid Genome (2003),* www.i-sis.org.uk/

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A. Warnings from Scientists

Monsanto's new Avatar

*Dr. T.V.Jagadisan, Former Managing Director, Monsanto India**

It is more than a couple of decades since I and some senior colleagues quit the firm in disgust with its anti-India policies and unwillingness to invest in a manufacturing venture of making weed-killers for various crops – mainly for Rice.

During one of my visits to St Louis, when I brought up the subject of investing in a manufacturing project in India, a senior Vice President had the gumption to say openly that they had no trust in our country. This and several other instances made me and my colleagues in India disillusioned with the plans of the company and several started quitting the company. (After my quitting, Monsanto brought in some measures like giving stock options to employees, putting up a research facility at the Indian Institute of science apparently to work on Genetic modification of crops.) Throughout the world, wherever Monsanto operated, there had been serious troubles of one sort or the other. (See the film "The world according to Monsanto).

Control is the keyword in Monsanto's work culture and the company knew that once it controls seed business in India, it would control Indian Agriculture. So the new avatar of Monsanto was born in India with the company collaborating with Maharashtra Hybrid seeds company (Mahyco). The first genetically modified crop that was introduced was cotton a non food crop for which the GEAC (Genetic Engineering Approvals Committee) did not raise any objections but approved its extensive field trials /commercialization. The performance of Bt cotton was a big failure in many states with around two lakh farmers committing suicide. The next target was the ubiquitous Brinjal (about 2400 varieties of which are grown in our country) as the entry point for an expanded agenda for various fruit, vegetable and cereal crops.

The history of Genetically modified crops (GMOs) in India has been a cloak and dagger business. With our ever dollar hungry institutions and so called research scientists, a weak ill informed Government machinery and an indifferent approvals committee, it was not difficult for Monsanto to get required approvals in spite of serious differences of opinion within the scientific community itself with the cautionary approach advised by a very important scientist member being totally ignored. The meagre data compiled by the interested company was accepted and Monsanto-Mahyco sailed out victoriously …until Mr. Jairam Ramesh, Minister for environment decided to visit all major brinjal growing states to gather first hand opinions from farmers and state government machinery. It was a thunderous 'no' from the growers with many state governments putting an embargo on GM crops in their states. Though agriculture is a state subject, the central Government has taken upon itself the right to impose GM crop trials and it seems an act is being brought to provide exemplary punishment to people opposing GM crops. One wonders if such an act can comply with our constitution which assures freedom of speech.

The main promotional point used by GM companies is that production will be increased to meet the needs of a growing population. This is basically a fallacy. India, by its traditional agriculture can produce required quantities. The main bottlenecks are proper irrigation, crop care, post harvest storage facilities and an efficient distribution network .

A lot more long term trials are to be conducted by independent agencies to assess carcinogenic, mutagenic and teratogenic consequences of GM crops. Under the false
cloak of increasing production or improving quality (which has been done for thousands of years by traditional selective plant breeding), the scientific community should not rush headlong into GM technology without understanding the consequences.

Traditional agriculture is in consonance with our national philosophy that respects the connection between various life forms including humans and the environment.

Let us not murder Indian agriculture by fostering genetically modified seeds without fully being aware of what it could lead us into both in terms of human and animal health and our natural biodiversity.

***T.V. Jagadisan, 84**, scientist and former managing director of Monsanto India, is a strong critic of Monsanto. He worked with Monsanto for nearly two decades, including eight years as the managing director of India operations.*

A. Warnings from Scientists

Experimenting With Life

*Dr. David Suzuki, David Suzuki Foundation, Canada**

I am a geneticist by training. At one time, I had one of the largest research grants and genetics labs in Canada. The time I spent in this lab was one of the happiest periods of my life and I am proud of the contribution we made to science. My introductory book is still the most widely used genetics text in the world.
When I graduated as a geneticist in 1961, I was full of enthusiasm and determined to make a mark. Back then we knew about DNA, genes, chromosomes, and genetic regulation. But today when I tell students what our hot ideas were in '61, they choke with laughter. Viewed in 2000, ideas from 1961 seem hilarious. But when those students become professors years from now and tell their students what was hot in 2000, their students will be just as amused.

At the cutting edge of scientific research, most of our ideas are far from the mark - wrong, in need of revision, or irrelevant. That's not a derogation of science; it's the way science advances. We take a set of observations or data, set up a hypothesis that makes sense of them, and then we test the hypothesis. The new insights and techniques we gain from this process are interpreted tentatively and liable to change, so any rush to apply them strikes me as downright dangerous.

No group of experts should be more aware of the hazards of unwarranted claims than geneticists. After all, it was the exuberance of geneticists early in this century that led to the creation of a discipline called eugenics, which aimed to improve the quality of human genes. These scientists were every bit as clever, competent, and well-meaning as today's genetic engineers; they just got carried away with their discoveries. Outlandish claims were made by eminent geneticists about the hereditary nature of traits such as drunkenness, nomadism, and criminality, as well as those judged "inferior" or "superior." Those claims provided scientific respectability to legislation in the US prohibiting interracial marriage and immigration from countries judged inferior, and allowed sterilization of inmates of mental institutions on genetic grounds. In Nazi Germany, geneticist Josef Mengele held peer-reviewed research grants for his work at Auschwitz. The grand claims of geneticists led to "race purification" laws and the Holocaust.

Today, the leading-edge of genetics is in the field of biotechnology. The basis of this new area is the ability to take DNA (genetic material) from one organism and insert it into a different species. This is truly revolutionary. Human beings can't normally exchange genes with a carrot or a mouse, but with DNA technology it can happen.
However, history informs us that though we love technology, there are always costs, and since our knowledge of how nature works is so limited, we can't anticipate how those costs will manifest. We only have to reflect on DDT, nuclear power, and CFCs, which were hailed as wonderful creations but whose long-term detrimental effects were only found decades after their widespread use.

Now, with a more wise and balanced perspective, we are cutting back on the use of these technologies. But with genetically modified (GM) foods, this option may not be available. The difference with GM food is that once the genie is out of the bottle, it will be difficult or impossible to stuff it back. If we stop using DDT and CFCs, nature may be able to undo most of the damage - even nuclear waste decays over time. But GM plants are living organisms. Once these new life forms have become established in our surroundings, they can replicate, change, and spread; there may be no turning back. Many ecologists are concerned about what this means to the balance of life on Earth that has evolved over millions of years through the natural reproduction of species.

Genomes are selected in the entirety of their expression. In ways we barely comprehend, the genes within a species are interconnected and interact as an integrated whole. When a gene from an unrelated species is introduced, the context within which it finds itself is completely changed. If a taiko drum is plunked in the middle of a symphony orchestra and plays along, it is highly probable the resultant music will be pretty discordant. Yet based on studies of gene behavior derived from studies within a species, biotechnologists assume that those rules will also apply to genes transferred between species. This is totally unwarranted.

As we learned from experience with DDT, nuclear power and CFCs, we only discover the costs of new technologies after they are extensively used. We should apply the Precautionary Principle with any new technology, asking whether it is needed and then demanding proof that it is not harmful. Nowhere is this more important than in biotechnology because it enables us to tamper with the very blueprint of life.

Since GM foods are now in our diet, we have become experimental subjects without any choice. (Europeans say if they want to know whether GMOs are hazardous, they should just study North Americans.) I would have preferred far more experimentation with GMOs under controlled lab conditions before their release into the open, but it's too late.

We have learned from painful experience that anyone entering an experiment should give informed consent. That means at the very least food should be labeled if it contains GMOs so we each can make that choice.
http://www.yesmagazine.org/issues/food-for-life/356

* ***David Suzuki****, geneticist, Co-Founder of the David Suzuki Foundation, is an award-winning scientist, environmentalist and broadcaster. He is renowned for his radio and television programs that explain the complexities of the natural sciences in a compelling, easily understood way. He is co-founder of the David Suzuki Foundation, an organization that works with government, business and individuals to conserve our environment by providing science-based education, advocacy and policy work, and acting as a catalyst for the social change that today's situation demands.*

V. VOICES FROM SCIENCE

B. Silencing scientific messengers :
Dr. Ignacio Chapela, Dr. Arpad Pusztai, Professor Gilles-Eric Seralini

Dr. Ignacio Chapela's Story[105]

Dr Ignatio Chapela was an assistant Professor at the University of California, Berkeley. While a microbial ecologist by training, he had served on the prestigious National Research Council's Committee on Environmental Impacts Associated with the Commercialization of Transgenic Plants. He and David Quist, graduate student under his supervision, had first sprung to prominence in 1988 as key opponents of a multi-million dollar public/private research partnership between Novartis and the University of Berkeley.

In 2000, during a workshop in southern Mexico to show farmers how to test seeds for GM, David Quist came across unexpected results: the local maize *criollo*, supposed to be pure and hence result negative, kept coming up positive showing GM contamination[106]. The ensuing saga led to the most acrimonious fight between opponents and proponents of GM since the Pusztai affair. It also laid bare a central strategy of the biotechnology industry, that of GM contamination, and raised questions about what many believe is one of its Achilles' heels: that it could be inherently unstable.

Dr. Chapela who had been assisting peasant farmers in community sustainable agriculture in Oaxaca for over 15 years, called for the samples to repeat testing in the US: the concern was that despite a moratorium on commercial growing of GM maize in Mexico standing since 1998, GM maize coming through food aid or imports from the US (because of NAFTA, up to 5 million tons enter every year, all in the absence of mandatory labeling [107]) was contaminating indigenous species and threatening Mexico's unique genetic diversity of maize, fundamental to the diet and livelihoods of the country's 10 million small farmers. Greenpeace had previously analyzed corn samples from Veracruz, Mexico imported from the USA and found it was Bt corn genetically engineered by the multinational pharmaceutical company Novartis. The Agriculture Ministry was informed, but no action followed.

Chapela and Quist's sample analysis through PCR (polymerase chain reaction) and inverse PCR techniques reached two conclusions: firstly that GM contamination had occurred in Mexican maize and secondly that the GM DNA seemed to be randomly fragmented in the genome of the maize. If the first point was contentious, the second was explosive, as it suggested that transgenic DNA was not stable. GM contamination of Mexican maize would represent a 'nightmare' scenario for the biotechnology industry; aware of the sensitivity of their contention, Dr. Chapela and his team took extra caution to ensure that their findings were correct. Once convinced, Dr. Chapela shared the preliminary results with various Mexican government officials who started their own testing. He also approached the scientific journal Nature to publish the results.

Dr. Chapela was hurriedly taken to meet Fernando Ortiz Monasterio, aide to the Biosafety Commissioner on the 12th floor of an empty building While Monasterio's aide blocked the door, Dr

[105] Adapted from Andrew Rowell: 'Seeds of Dissent' & 'Immoral Maize' an extract from 'Don't Worry, It's Safe to Eat'
[106] Platoni, K (2002) 'Kernels of Truth', East Bay Express, San Francisco, 29 May.
[107] BioDemocracy News (2002) 'Frankencorn Fight: Cautionary Tales', No 37, January, p1.

Chapela was threatened and intimidated of dire consequences for him and his family were he to go ahead and publish. He was then offered to join a team with Monsanto and DuPont scientists, which he refused. Realizing that Chapela would nonetheless publish the results in Nature, Monasterio hastily called a meeting with Greenpeace and the people from Codex and from the Senate in order to divulge the results, knowing that media coverage would seriously threaten publication in Nature.[108]

The threats against Dr. Chapela intensified; he received an intimidation letter informing him that the government had 'serious concerns' about the 'consequences that could be unleashed' from his research and that it would 'take the measures it deem(ed) necessary to recuperate any damages to agriculture or the economy in general that this publication's content could cause'.[109] Chapela wasn't surprised as the Agriculture Ministry is 'riddled with conflicts of interest and are just working as spokespeople for DuPont, Syngenta and Monsanto.'

In the meantime, the Mexican government established an independent research effort: on 17 September 2001, Mexico's Secretary for Environmental and Natural Resources released partial results confirming that transgenic maize had indeed been found in 15 of 22 areas tested in Oaxaca and nearby Puebla.[110]

As Chapela's team went ahead with publishing its findings in Nature, reporting GM contamination of native corn, he became the victim of a concerted campaign by GM lobbies and university colleagues, already angered at his opposition to the Novartis $50 million buyout, to discredit his findings.

The central coordinator of the attacks was CS Prakash, a professor of Plant Molecular Genetics who runs the AgBioWorld Foundation. The discussions on his pro-GM website (which on other occasions had linked environmental groups like Greenpeace and activists such as Vandana Shiva to terrorism[111]) resulted in a highly critical Joint Statement attacking Nature that received nearly 100 signatories. In reality, it wasn't scientists to fuel the debate but the Bivings group, a Public Relations company that had been assisting more than a dozen Monsanto companies clean their image up, posting anonymously as third parties. Leading anti GM activist J. Matthews said, "Via Bivings, Monsanto has a series of shop windows with which to influence the GM debate. One of these is AgBioWorld."

Several scientists and experts concurred that such instances - much like the Putzsai's story - reveal the biotech industry's attempts to silence and discredit independent science that is in any way critical of their technologies. Yet they were mistaken in believing they could make such controversies disappear: 144 farmer and other civil society organizations from 40 countries signed a statement on the scandal in February 2002, stating that 'A huge controversy has erupted over evidence that the Mesoamerican Center of Genetic Diversity is contaminated with genetically modified maize. Two respected scientists are under global attack and the peer-review process of a major scientific publication is being threatened.' 'Pro-industry academics are engaging in a highly unethical and mud-slinging campaign

[108] Dalton, R (2001) 'Transgenic Corn Found Growing in Mexico', Nature, London, Vol 413, 27 September, p337.
[109] Ferris, S (2002) 'Battle Lines Drawn in Mexico; Native Corn too Sacred to "Infect"?' The Atlanta Journal and Constitution, 28 February.
[110] Dalton (2001) op cit.
[111] Apel, A (2001) The Face of Terrorism, posting on AgBioView, 18 September

against the Berkeley researchers.'[112]

On the 4th of April 2002, Nature issued a statement on its website that, because of disagreement between Chapela and Quist and one reviewer, and 'several criticisms of the paper, Nature has concluded that the evidence available is not sufficient to justify the publication of the original paper.'[113] Two of the three referees hadn't disputed the main conclusion; the third referee, Dr. Campbell published the retraction.[114] Chapela accused Campbell of 'siding with a vociferous minority in obfuscating the reality of the contamination of one of the world's main food crops with transgenic DNA of industrial origin'.[115]

Chapela requested that Nature print a 'statement of conflict of interest from all authors,' regarding the conflict over Novartis funding Berkeley. Instead, Nature published two letters claiming the scientists' findings to be basically unfounded;[116] each author of the critical letters was in some way connected to the Novartis-Berkeley relationship. It was noted that the controversy was taking place 'within webs of political and financial influence that compromise the objectivity of their critics.' The Nature Publishing Group in fact has integrated interests with companies invested in biotechnologies such as Novartis, AstraZeneca and other "sponsorship clients," soliciting them to "promote their corporate image by aligning their brand with the highly respected Nature brand."[117]

Quist and Chapela confirmed beyond reasonable doubt the consistency of their findings; a part of their tests where sequences had been misidentified was retested through different methodologies and the results further supported their primary statement.[118] Ironically the fact that GM contamination had occurred is no longer disputed even by GM opponents, including by Prakash's AgBioWorld.

In April 2002, Jorge Soberon, executive secretary of Mexico's National Commission on Biodiversity, announced the findings of the government's research at the International Conference on Biodiversity at The Hague, confirming that tests had shown the level of contamination was far worse than initially reported, with evidence of contamination found at 95 per cent of the sites, also re-confirming the presence of the Cauliflower Mosaic Virus.[119] Jorge Soberon stated that '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'.[120]

In August 2002 the President of Mexico's National Institute of Ecology also confirmed that his team had found 'basically the same result that Chapela reported in his study, and both results suggested the presence of transgenic constructs in native maize varieties'[121]. Nature still rejected the independent

112 ETC Group (2002) UnNatural Rejection? The Academic Squabble Over Nature Magazine's Peer-Reviewed Article is Anything but Academic, News Release, Winnipeg, 19 February.
113 Nature (2002) 'Editorial Note', 4 April.
114 BBC NewsNight (2002) 'Row Over GM Crops – Mexican Scientist Tells Newsnight he Was Threatened Because He Wanted to Tell the Truth', London, 7 June; Meek, J (2002) 'Science Journal Accused Over GM Article', The Guardian, London, 8 June.
115 Chapela, I (2002) And Yet it Moves, Letter to the Guardian, 24 May
116 Metz and Fütterer (2002) 'Suspect Evidence of Transgenic Contamination' Nature, 4 April; Kaplinsky et al (2002) 'Maize Transgene Results in Mexico are Artefacts' Nature, 4 April
117 Worthy, K, Strohman, R and Billings, P (2002) Correspondence, Nature, Vol 417, 27 June, p897.
118 Quist, D and Chapela, I (2002) Brief Communications, Nature, 4 April.
119 Brown, P (2002) 'Mexico's Vital Gene Reservoir Polluted by Modified Maize', The Guardian, London, 19 April.
120 Clover, C (2002) '"Worst Ever" GM crop invasion' The Daily Telegraph, 19 April
121 Abate, T (2002) 'Hot Seat May Cool for Berkeley Prof: Mexican Scientists Reportedly Confirm his Findings of Engineered Corn in Maize', The San Francisco Chronicle, 26 August

studies into GM contamination for publication for opposing reasons: one reviewer said that the results were so 'obvious' that they did not merit publication, whereas the other said the results were 'so unexpected as to not to be believable.'[122]Over a year after the revelation of GM contamination in Mexico, the controversy continued and nothing had been done to stop the source of contamination.
In the Joint Statement signed by pro-GM scientists Kaplinsky, Metz and Prakash one statement stands out: 'It is important to recognize that the kind of gene flow alleged in the Nature paper is both inevitable and welcome.' [123][90] Ironically it is in the biotech companies' interests not to address the contamination problem, although that is not in the interests of consumers who want choice. 'The hope of the industry is that over time the market is so flooded [with GMOs] that there's nothing you can do about it, you just sort of surrender,' said Don Westfall, vice-president of Promar International, a consultant to the biotechology and food industries in Washington.[124]

Critics of the biotech industry strongly differ. 'It is not beneficial for the Mexican campesinos or peasants or indigenous peoples. It is not beneficial for the Mexican environment and it not beneficial for world food security.' said Hector Magallon Larson of Greenpeace Mexico.

Ignacio Chapela *is an microbial ecologist and mycologist at the University of California, Berkeley. He is best known for a controversial 2001 paper in Nature on the flow of transgenes into wild maize populations, as an outspoken critic of the University of California's ties to the biotechnology industry, as well as a later dispute with the University over denial of tenure that Chapela argued was politically motivated. Chapela is also notable for his work with natural resources and indigenous rights.*

The Story of Dr. Arpad Pusztai

Dr. Arpad Pusztai is a world renowned scientist who received his degree in chemistry in Budapest and his B.Sc. in physiology and Ph.D. in biochemistry at the University of London. His career spans 50 years and work at universities and research institutes in Budapest, London, Chicago and Aberdeen (Rowett Research Institute). He has published nearly 300 peer-reviewed papers and wrote or edited 12 scientific books.

Dr. Pusztai pioneered research into the dietary effects of consuming genetically modified (GM) foods. He studied the effects of dietary lectins (carbohydrate-reactive proteins) on the gastrointestinal tract, including lections transgenically expressed in genetically modified (GM) crop plants. His 1999 GM study results, co-authored with Dr. Stanley Ewen and controversially published in the respected British medical Journal *The Lancet*, remains the most sensitive and rigorous GM feeding trial ever conducted.

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122 Rosset, P (2002) Open Letter to Nature, October; Food First (2002) Nature Refuses to Publish Mexican Government Report Confirming Contamination of the Mexican Maize Genome by GMOs, Press Release, Oakland, 24 October; ETC Group (2002) GM Fall-out from Mexico to Zambia: The Great Containment The Year of Playing Dangerously, Winnipeg, 25 October.
123 Prakash, C (2002) Joint Statement of Scientific Discourse in Mexican GM Maize Scandal, 24 February.
124 Laidlaw, S (2001) 'Starlink Fallout Could Cost Billions', The Toronto Star, Toronto, 9 January.

Discovering GM Dangers

In 1997, Dr. Pusztai and his wife and colleague Dr. Susan Bardocz carried out the first carefully designed and highly sensitive nutrition and toxicologiocal feeding study, testing a genetically modified food: potatoes engineered to express the snowdrop lectin gene. Initially, when Dr. Pusztai, was commissioned to do a study on genetically modified foods, he was supportive of genetically engineering organisms (GMOs). When he fed genetically engineered potatoes to lab rats, the results raised concerns of the health risks associated with consuming GE food. The organs of the rats had become critically damaged and their immune systems were severely weakened.

Dr Pusztai pointed out that since present regulations do not require long term safety testing, substances in genetically engineered (GE) foods which have a slow acting effect would not be detected. The regulations prescribe an approval procedure based on the principle of substantial equivalence, the risky assumption that the GE foods are equivalence to the naturally occurring varieties. In practice, this procedure allows very superficially tested foods to be approved. As an illustrative example, he mentioned fresh results from his research on pesticidal Lectins. Pusztai found that the rats developed immune system defects and stunted growth after a time period corresponding to 10 years of human life.

When he discussed their findings in an interview broadcast on January 13, 1998 as part of the evening BBC news, the news triggered a series of events that have profoundly impacted scientific and public understanding of GM foods.

The Pusztai Affair

As a result of taking his findings public, Dr. Pusztai was terminated, and both his research and reputation were attacked. The director of the Rowett Research Institute, the lab sponsoring his studies, initially congratulated him for the media attention. However, just days after the interview, Dr. Pusztai was terminated from his duties by the same supervisor. His laboratory notes were confiscated, and he was in effect banned from any further interaction with his colleagues at Rowett. His wife was then the manager of the division of the Rowett Institute where the work was carried out. She, too, lost her job over the controversy triggered by the article.

Many claims were main in order to discredit the whistleblowing researcher. It was said that the GE potatoes were not intended to be used as food. It was maintained that the results reported by Dr Pusztai were misleading because he had mixed up the results of different studies. In that context, his age was brought up at 68, alleging he was a senile and confused person. It was also said that the research had not been done on GE potatoes but on a mixture of natural potatoes and Lectin. It was indicated in a depreciating way that the quality of Dr Pusztai's research was deficient. At the same time as he was suspended, he was prohibited to speak with the media to defend himself. Pusztai later assured the lectin potatoes used in the study were indeed intended as food, though the Rowett Institute denied this.

Puzstai seminal's article on the impacts of GM potatoes on rats appeared in the October 1999 issue of the respected British medical journal *The Lancet*, stirring up further controversy. The research

was subjected to an unprecedented two-year campaign of criticism carried out by proponents of GM technology. The U.K. Royal Society played an active role in organizing and publicizing criticisms of the Pusztai-Ewen experiment. *The Lancet* subsequently published a series of letters raising various questions and criticisms, to which Pusztai and Ewen responded fully. Despite the barrage of claims and threats from the Biotechnology industry and the supporters who profit from it, the validity of their study and its findings remain intact.

Pusztai and Ewen initially knew little about the controversy and risks of researching and publicizing GM foods when they successfully competed for the $1.2 million grant from the Scottish government that supported their GM potato feeding study. They did not anticipate the events that would be triggered by their work and a brief report on the evening BBC news program. In fact, Pusztai was supportive of biotechnology prior to conducting the research which uncovered harmful health effects.

Dr. Pusztai prevented approval of risky GM foods

Dr. Pusztai decided to alert the public and skip the standard protocol of waiting until his results had been peer reviewed. He stepped forward because he believed if had he not revealed the danger the GE lectin potatoes would have made their way to market quickly and unchecked. The concern is because legally they were "substantially equivalent" with the natural variety. This case demonstrates the serious insufficiency of the present regulations for food safety that lack long term testing of GE foods.

When asked if he regret speaking publicly about his research prior to publication - generally regarded as a cardinal sin by scientists Pusztai responded, "No, I was publicly funded and I thought the public had a right to know."

Árpád Pusztai *is a Hungarian-born biochemist and nutritionist who spent 36 years at the Rowett Research Institute in Aberdeen, Scotland. He is a world expert on plant lectins, authoring 270 papers and three books on the subject. Pusztai's annual contract at Rowett was not renewed following the incident and he moved back to Hungary. He has been giving lectures on his GM potato work and on claimed dangers in general of genetic engineering of crop plants In 2005, he received the Whistleblower Award from the German Section of the International Association of Lawyers against Nuclear Arms (IALANA) and the Federation of German Scientists (VDW). In 2009, Pusztai and his wife received the Stuttgart peace prize (Stuttgarter Friedenspreis).*

Sources:

1) Adapted from "GM Food/Feed: Gaps in risk-associated research that need to be filled" 2003 online at http://www.leopold.iastate.edu/news/pastevents/pusztai/pusztai.htm
2) Adapted from an account written by Dr. Charles Benbrook, the Organic Center's Chief Scientist and an expert on agricultural policy, science and regulatory issues.
3) Ewen SW, Pusztai A (October 1999). "Effect of diets containing genetically modified potatoes expressing Galanthus nivalis lectin on rat small intestine." *Lancet* **354** (9187): 1353–4. doi:10.1016/S0140-6736(98)05860-7. PMID 10533866.

Professor Gilles-Eric Seralini

Gilles-Eric Seralini is Professor in Molecular Biology at University of CAEN, France and President of the Scientific Board at the Committee for Research and Independent Information on Genetic Engineering (CRIIGEN). Because of his expertise on the subject of GMOs, he was appointed member of two governmental commissions, the Biomolecular Engineering Commission (CGB) and the Biovigilance Committee; he was appointed by the European Commission to work on the EU defense case in relation to the moratorium on commercial GMOs and also by the Supreme Court of India to evaluate data on the controversial Bt-Brinjal, subject to a moratorium henceforth.

While Professor Seralini's expertise and substantial body of work have won him wide recognition[125] and credentials, his research on food safety and particularly on the impact of GMOs on human health has attracted the wrath of the GM industry and pro-GM lobby. His findings raise serious doubts about the reliability of company sponsored research internationally and the validity of local food safety authority approvals for commercialization of GMOs. As a result, Professor Seralini has been the subject of virulent personal and professional attacks from both the pro-GMO lobby and industry and international authorities which have time and again attempted to undermine his credibility.

As part of its research, CRIIGEN has carried out different studies on GM crops and products. Seralini had previously assessed the effect of Monsanto Roundup on human cells, determining that the herbicide could cause damage or death of particularly embryonic, placental and umbilical cord cells. The findings[126], published in the *Chemical Research in Toxicology*, were dismissed by Monsanto as *political*[127]. At the same time, the French Minister of Agriculture turned down a request by CRIIGEN for a suspension in the marketing authorization for Roundup, resting the decision on existing authority approvals[128].

In a breakthrough report[129] which covered 3 of Monsanto's GM maize varieties - MON 863, MON 810, NK603 - Professor Seralini along with colleagues J. Spiroux de Vendomois, F. Roullier and D. Cellier found that pesticide residues would be transferred into food and feed, posing serious health risks if consumed. Conducting an independent cross examination of Monsanto's confidential data – obtained after a German court order ruled the confidentiality clause illegal – the team reached the worrying conclusion that, despite having been approved as safe for commercialization, these maize varieties were in fact showing signs of adverse impact in various degrees on kidney, livers, as well as to dietary detoxifying organs, heart, adrenal glands, spleen and to the haematopoietic system[130].

The warning signs not only undoubtedly made a case for further research at the least, but also raised serious questions over the approval granted for commercialization especially by European and French

[125] Order of the Star of Europe, de l'Etoile de l'Europe, rank of Commander, from the European Foundation, Commission of the Arts, Sciences and Humanities; Denis Guichard Prize under the aegis of Fondation de France
[126] "Glyphosate Formulations Induce Apoptosis and Necrosis in Human Umbilical, Embryonic and Placental Cells" by Nora Benachour and Gilles-Eric Séralini (http://pubs.acs.org/doi/abs/10.1021/tx800218n)
[127] http://www.monsantoblog.com/2009/06/23/seralini-safety-study/
[128] http://www.criigen.org/SiteEn/index2.php?option=com_content&do_pdf=1&id=256
[129] "A comparison of the effects of three GM corn varieties on Mammalian health" by Joël Spiroux de Vendômois, François Roullier, Dominique Cellier, Gilles-Eric Séralini (http://www.biolsci.org/v05p0706.htm)
[130] http://www.criigen.org/SiteEn/index.php?option=com_content&task=blogcategory&id=79&Itemid=118

food safety authorities such as EFSA, AFFSA, CGB. The researchers called for immediate prohibition of cultivation and import of the GMOs recommending additional long term, multi generational studies on at least three species, so to provide scientific and valid data to assess the acute, toxic and chronic health impact of GM in food or feed[131]. The studies that had led to approval had been conducted on rats for 90 days only, proving insufficient to determine its safety for consumption.

While the authorities and Monsanto dismissed Seralini's findings on grounds of scientific inadequacies and his supposed *anti-Monsanto* sentiment, the French Association for Plant Biotechnology (AFVB) headed by Marc Fellous embarked on a "smear campaign" against Seralini, publicly questioning his independence as a scientist on grounds of funding received from Greenpeace and claiming that the scientific community found the study to be invalidated, despite the same having been subject to peer review and published in the distinguished *International Journal of Biological Sciences*.

The retaliation went further: after Professor Seralini was invited to discuss his findings in a television program on France 5's "Health Magazine" the AFVB sent a letter to the channel and to the High Audio Visual Department, expressing its outrage for the public appearance of someone whom it defined a "*merchant of fear*" and a biased *militant;* in the letter the AFVB refuted Seralini's independence or the standing of his scientific findings, and claiming his work to be fuelled by ideology only.

Professor Seralini fought back to defend his career, reputation and independent research in the public interest: in one of the first instances where a whistleblower is not the defendant but the petitioner, he moved defamation charges against Marc Fellous, Director of the AFVB, whom he identified along with researchers Claude Allegre, Axel Kahn to be behind the smear campaign launched against him.

In a significant victory, on 18th January 2011 the court ruled in favour of Seralini, acknowledging that the attacks moved by the AFVB against him amounted to defamation and awarding legal costs, a fine of 1.000 Euros and damages of 1 Euro, as requested by Prof. Seralini, to Marc Fellous. The latter is also facing a complaint for the use of forgery in a document presented in relation to the libel case.

During the court case, it also emerged that the AFVB Director Marc Fellous, who had all along claimed absolute scientific independence, had in fact failed to report holding patents with the Israel based company Yeda Research and Development Co. Ltd, linked to multinational corporations such as Novartis, Bacter, Pfizer, Johnson and Johnson with business and clear interests in GM. Several other members of the AFVB were found to have direct links with agribusiness, revealing a disturbing conflict of interest[132]: Claude Fauquet for example is part of the Donald Danforth Plant Science Center, recipient of a $50 million gift from Monsanto Fund and of 40 acres of land from Monsanto Company[133].

Though Professor Seralini has undoubtedly suffered the price of unjust accusations and personal attacks by Monsanto and the pro-GM lobby, independent scientists, researchers, citizens and activists around the world rallied to his defense, signing a petition supporting him and his colleagues and the cause of open scientific discourse in the interest of health, safety and well-being of broader society.

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131 http://www.criigen.org/SiteEn/index.php?option=com_content&task=blogcategory&id=79&Itemid=118
132 http://robin.blog.arte.tv/2010/12/06/le-proces-seralini-fellous-et-les-conflits-dinteret-de-lafbv/
133 http://www.danforthcenter.org/the_center/about_us/history.asp.

Prof. Gilles Eric Seralini *is a Molecular Biology Professor at Caen University, since 1991, France - One the very first to demand a European commercial moratorium on agricultural GMOs for further research. Appointed member of two governmental commissions on GMOs (the Biomolecular Engineering Commission (CGB) in charge of risk assessment, and the Biovigilance Committee assessing GMOs after they have been commercialized) in 1998; President of the CRII-GEN Scientific Board (Committee of Independent Research and Information on Genetic Engineering) since 1999; was appointed in 2003 as an expert for the European Commission to prepare the defense case in the dispute between the United-States/Argentina/Canada (who produce 95% of the GMO's) and the European Union about the moratorium on commercial GMO.*

VI. THE HISTORY OF MONSANTO

A. Timeline: 1901-2009*

Over its 108-year history, Monsanto Co (MON.N), the world's largest seed company, has evolved from primarily an industrial chemical concern into a pure agricultural products company. Following is a timeline of the St. Louis, Missouri-based company's history published by Reuters, 11 November 2009.

- 1901 - Original Monsanto founded as a maker of saccharine by John F. Queeny and named after his wife, Olga Monsanto Queeny.
- 1920s and 1930s - Manufacturers sulfuric acid and other chemicals, including polychlorinated biphenyls (PCBs), which are later implicated in reproductive, developmental and immune system disorders.
- 1940s - Manufactures plastics and synthetic fabrics
- 1960s - Establishes agricultural division with focus on herbicides.
- 1962-1971 - Becomes one of principal companies supplying herbicide known as Agent Orange to U.S. military for use in Vietnam War. Agent Orange is later linked to various health problems, including cancer.
- 1976 - Commercializes Roundup herbicide, which goes on to be a top seller around the world.
- 1982 - Some 2,000 people are relocated from Times Beach, Missouri, after area is contaminated with PCB by-product dioxin. Critics say a St. Louis-area Monsanto chemical plant was a source but company denies any connection.
- 1994 - Wins regulatory approval for its first biotech product, a dairy cow hormone called
- company. Sells Posilac business amid consumer and food industry concerns about the dairy cow hormone supplement.
- 2008-2009 - U.S. Department of Justice says it is looking into monopolistic power in the U.S. seed industry.
- 2009 - Posts record net sales of $11.7 billion and net income of $2.1 billion for fiscal 2009. Announces project to improve the living conditions of 10,000 small cotton and corn farmers in 1,100 villages in India; Posilac.
- 1996 - Introduces first biotech crop, Roundup Ready soybeans, which tolerate spraying of Roundup herbicide, and biotech cotton engineered to resist insect damage.
- 1997 - Spins off its industrial chemical and fibers business into Solutia Inc amid complaints and legal claims about pollution from its plants. Introduces new biotech canola, cotton and corn, and buys foundation seed companies.
- 1998 - Introduces Roundup Ready corn.
- 2000-2002 - Restructures in deal with Pharmacia & Upjohn Inc; separates agricultural and chemicals businesses and becomes stand-alone agricultural company.
- 2002-2003 - Jury finds Monsanto plant in Anniston, Alabama, polluted community with PCBs. Monsanto and Solutia agree to pay $600 million to settle claims brought by 20,000 Anniston residents of PCB ground and water contamination.
- 2003 - Solutia files Chapter 11 bankruptcy.
- 2004 - Monsanto forms American Seeds Inc holding company for corn and soybean seed deals and begins brand acquisitions.
- 2005 - Environmental, consumer groups question safety of Roundup Ready crops, say they create "super weeds," among other problems.
- 2006-2007 - Buys several regional seed companies and cotton seed leader Delta and Pine Land Co. Competitors allege Monsanto gaining seed industry monopoly.
- 2008 - Acquires sugarcane breeding companies, and a Dutch hybrid seed donates cotton technology to academic researchers.

**http://www.reuters.com/article/2009/11/11/food-monsanto-idUSN1032100920091111*

VI. HISTORY OF MONSANTO

B. Record of Monsanto

*Dr. P.M. Bhargava**

- 1969: Produces Agent Orange, which was used as a defoliant by the U.S. Government during the Vietnam War. I have myself seen defoliated trees over a hundred miles south of Hanoi in 1982.
- 1976: Monsanto produces Cycle-Safe, the world's first plastic soft-drink bottle. The bottle, suspected of posing a cancer risk, is banned the following year by the Food and Drug Administration of the U.S.
- 1986: Monsanto found guilty of negligently exposing a worker to benzene at its Chocolate Bayou Plant in Texas. It is forced to pay $100 million to the family of Wilbur Jack Skeen, a worker who died of leukaemia after repeated exposures.
- 1986: Monsanto spends $50,000 against California's anti-toxics initiative, Proposition 65. The initiative prohibits the discharge of chemicals known to cause cancer or birth defects into drinking water supplies.
- 1987: Monsanto is one of the companies named in an $180 million settlement for Vietnam War veterans exposed to Agent Orange.
- 1988: A federal jury finds Monsanto Co.'s subsidiary, G.D. Searle & Co., negligent in testing and marketing of its Copper 7 intrauterine birth control device (IUD). The verdict followed the unsealing of internal documents regarding safety concerns about the IUD, which was used by nearly 10 million women between 1974 and 1986.
- 1990: EPA chemists allege fraud in Monsanto's 1979 dioxin study which found their exposure to the chemical doesn't increase cancer risks.
- 1990: Monsanto spends more than $405,000 to defeat California's pesticide regulation Proposition 128, known as the "Big Green" initiative. The initiative was aimed at phasing out the use of pesticides, including Monsanto's product Alachlor, linked to cancer and to global warming.
- 1991: Monsanto is fined $1.2 million for trying to conceal discharge of contaminated waste water into the Mystic River in Connecticut.
- 1995: Monsanto is sued after allegedly supplying radioactive material for a controversial study which involved feeding radioactive iron to 829 pregnant women.
- 1995: Monsanto ordered to pay $41.1 million to a waste management company in Texas due to concerns over hazardous waste dumping.
- 1995: The Safe Shoppers Bible says that Monsanto's Ortho Weed-B-Gon Lawn Weed Killer contains a known carcinogen, 2,4 D.
- 2005: According to the U.S. Securities & Exchange Commission, Monsanto bribed at least 140 Indonesian officials or their families to get Bt cotton approved without an environmental impact assessment (EIA). In 2005, Monsanto paid $1.5 million in fines to the US Justice Department for these bribes.
- 2005: Six Government scientists including Dr. Margaret Haydon told the Canadian Senate Committee of Monsanto's 'offer' of a bribe of between $1-2 million to the scientists from Health Canada if they approved the company's GM bovine growth hormone (rbGH) (banned in many countries outside the US), without further study, and how notes and files critical of scientific data provided by Monsanto were stolen from a locked filing cabinet in her office. One FDA scientist arbitrarily increased the allowable levels of antibiotics in milk 100-fold in order to facilitate the approval of rbGH. She had just arrived at the FDA from Monsanto.
- 2005: The US Patent and Trademark Office rejected four key Monsanto patents related to GM crops that the Public Patent Foundation (PUBPAT) challenged because the agricultural giant is using them to harass, intimidate, sue - and in some cases bankrupt - American farmers. Monsanto

devotes more than $10 million per year to such anti-farmer activities, over alleged improper use of its patented seeds.

- 2005: The Alabama Court Judgement in February 2002 best describes the sort of business that Monsanto is in. In 1966, court documents in a case concerning Anniston residents in the US showed that Monsanto managers discovered that fish dunked in a local creek turned belly-up within 10 seconds, spurting blood and shedding skin as dropped into boiling water. In 1969, they found fish in another creek with 7,500 times the legal PCB level. But they never told their neighbours and concluded that "there is little object in going to expensive extremes in limiting discharges – we can't afford to lose one dollar of business". In fact court documents revealed that the company withheld evidence about the safety of their PCBs to the residents of the town that were being poisoned by their factory to keep their profitable dollars. On February 22, 2002, a court found Monsanto guilty on six counts of Negligence, Wantoness And Supression of the Truth, Nuisance, Trespass And Outrage. Outrage according to Alabama law is conduct "so outrageous in character and extreme in degree as to go beyond all possible bounds of decency so as to be regarded as atrocious and utterly intolerable in civilized society."
- 2005: Monsanto omitted incriminating data altogether from its 1996 published study on GM soybeans. When the data was recovered later by an investigator, it showed that GM soy contained significantly lower levels of protein and other nutrients and toasted GM soy meal contained nearly twice the amount of a lectin (protein) that may block the body's ability to assimilate other nutrients. Furthermore, the toasted GM soy contained as much as seven times the amount ot trypsin inhibitor, a major soy allergen. Monsanto named their study: "The composition of glyphosate-tolerant soybean seeds is equivalent to that of conventional soybeans"
- In Europe, Monsanto refused to reveal the results of its own secret animal feeding studies, which revealed serious abnormalities to rats fed GM corn, citing CBI (Confidential Business Information) until forced to do so by a German Court. One of its Bt corn products (the only GM crop grown in the EU) was subsequently banned for planting in France and other EU countries based on the appraisal by Seralini of Monsanto's own dossier.
- 2009: A U.S. Federal Court ruled on 24th September, 2009, that USDA violated federal law by allowing Monsanto's genetically engineered sugar beet on the market.
- 2009: As is usually known (and supported by a letter from Meera Shankar, our Ambassador to the U.S., to PMO), it is common for U.S. MNC's to bribe Indian officials to achieve their objectives.

* ***Dr. P. M. Bhargava****, architect of molecular biology and biotechnology in India. Is currently the chairman of MARCH (The Medically Aware and Responsible Citizens of Hyderabad). A recipient of the Padma Bhushan and France's highest civilian honour, Legion d'Honneur, the National Citizens' Award, founder director of one of the world's best laboratories in modern biotechnology, the Centre of Cellular and Molecular Biology, Hyderabad, currently a centre of excellence recognized by UNESCO.*

VII. ACTIONS FOR FOOD DEMOCRACY

GMOs have become the testing site for our freedoms and democracy.
They are defining the entire system of control of our food, based on an illusion.

Over the last two decades movements have grown around the world with creative actions and creative ideas that have helped people resist GMOs.

This report is a distillation of the movement for building the food democracy that has become vital for our survival.

Below are actions that will contribute towards achieving this goal.
Join the chorus in exposing the GMO Emperor and help build Food Democracy for all.

- **Campaign to Disinvest from Monsanto:** get your money out of Monsanto – at the personal level and at the institutional level. Don't invest in financial institutions that invest in Monsanto. Start a campaign of disinvestment from Monsanto and lobby governments, banks, foundations and organizations to divest from Monsanto.
The youth of Norway have already started the process to get Norway's Oil Fund out of Monsanto. *http://www.combat-monsanto.co.uk, www.monsanto.no*

- **Boycott GMOs - Eat organic.** Stop buying GMO products. One of the illusions created by the GMO Emperor is that organic cannot feed the world. This is scientifically not the case as pointed out in the IAASTD report and UN Special Rapporteur report on the right to food. *www.gene-watch.org. http://www.organicconsumers.org/action.cfm*

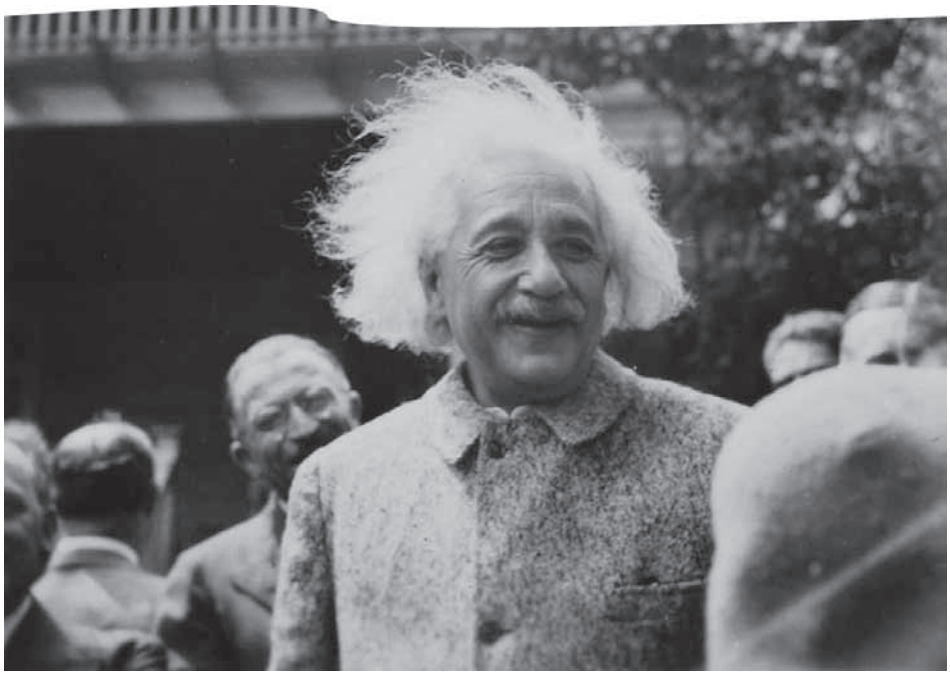
- **Demand Labeling of GMOs.** Uphold your right to know what you eat. In a food democracy you have the right to know what you eat. On July 5, 2011, Codex Alimentarius, the international food safety body recognized the right of countries to label GMO foods. Thus (after 20 years of battle) the consumer right to be informed has been secured. *www.consumersinternational.org*

- **Put your money to support local ecological/organic food projects and invest in the future**. Become partners with farmers who are producing organic food, join Community Supported Agriculture (CSAs), support a farmer's market, and support organic farming in your region to build local food systems through creative innovative local financing. Start Gardens of Hope in your community, your backyard and in your schools. *http://www.organicgardeninfo.com*

- **Campaign to get your village/town/region/country GMO-free**. Become part of the world wide GMO-free movement. Write to your municipality, your town council, your regional government and your national government that you want your region to be GMO-free. Join the True Food Network to sign on to letters to Congress, governmental agencies, and other campaigns as well as receive action alerts for events across the U.S. *http://truefoodnow.org*

- **Help save seeds.** Support groups that save seeds and are reclaiming seed as a commons. Create community seed banks, to save and exchange open pollinated varieties of seeds. Seed freedom is the first step in food freedom. Saving Our Seeds provides information, resources, and publications for gardeners, farmers, seed savers, and seed growers. *http://www.savingourseeds.org*

And finally:
- **Join the chorus** in exposing the GMO Emperor and help build real Food Democracy for all sign on at: *www.navdanyainternational.it*



http://murfdipity.com/

"We can't solve problems by using the same kind of thinking we used when we created them"

Albert Einstein