monsanto

Somakka, a woman farmer from Andhra Pradesh, India with her failed harvest of Bt cotton.

issue 110

who benefits from gm crops?

monsanto and the corporate-driven genetically modified crop revolution

executive summary

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This is the executive summary of a full-length publication by the same title. The full-length version of Who Benefits from GM Crops? can be obtained by contacting Friends of the Earth International, *info@foei.org*.

Monsanto's Bt cotton in Andhra Pradesh.

executive summary

introduction

This report analyzes the way in which GM crops have been introduced into our environment between 1996 and 2005. It describes how the rapid penetration of GM crops in a limited number of countries has largely been the result of the aggressive strategies of the biotech industry, particularly pushed by top GM crop leader Monsanto, rather than the consequence of the benefits derived from the use of this technology.

The hype about the advantages that GM crops provide to the environment, consumers, and farmers is also predominantly the result of propaganda by the biotech industry and industry-sponsored organizations including the International Service for the Acquisition of Agri-biotech Applications (ISAAA). ISAAA's annual reports, published at the beginning of every year since the late 1990s, have misrepresented the performance of GM crops. They have lauded the benefits that have accompanied the introduction of GM crops everywhere, and have ignored the negative impacts and other problems. In fact, as this report shows, the reality of GM crops has been strikingly different from Monsanto and ISAAA's claims.

This report illustrates how Monsanto, a multinational corporation and the

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Soy in South America.

world's leading producer of GM crops, has managed to attain an unacceptable influence over national and international agricultural and food policies in many countries around the world. It describes how Monsanto was in the driver's seat when the United States, Brazil and other governments developed legislation relating to GMOs, resulting in industry-friendly policies. Monsanto has used other improper strategies as well: bribing officials in Indonesia in order to obtain regulatory approval, and running misleading promotion strategies in India and other countries. Monsanto's products have also been found in areas where they were forbidden, including Brazil, Paraguay, and India, paving the way for eventual legal authorization.

Monsanto's influence over governments is so large that many of them, as well as United Nations bodies such as the Food and Agriculture Organization (FAO), have adopted the company's claims that GM products are good for the environment and will contribute to the alleviation of poverty and hunger.

In addition, Monsanto is in the midst of a huge push to introduce new intellectual property rights regimes over its GM seeds in order to enhance its domination over the global seed and food supply.

This report shows that Monsanto's pesticide reduction claims are unfounded, and that in fact GM soy has dramatically increased pesticide use. Claims that GM crops will contribute to poverty reduction have also thus far been unfounded, as have claims that consumers benefit from GM products. Ultimately, it is Monsanto and other GM companies that profit the most from the aggressive promotion of their GM products.

It is time for governments to take responsibility for the unethical behavior of the proponents of GM seeds and food, putting the interests of people and the environment first. Governments must stop giving unacceptable privileges to companies like Monsanto, and stop endorsing the misleading claims of organizations like ISAAA.

This publication is based on numerous reports from scientific-technical bodies, industry, government, and civil society, and is illustrated by fully-referenced national and regional case studies from every continent.

fast and concentrated adoption of gm crops worldwide

In 1994, a genetically modified (GM) crop was commercialized in the United States for the first time. Two years later, the first significant areas of land devoted to GM crops were sown, over 1 million hectares, the vast majority of which were in the United States. Ten years later, there are 80 million hectares of GM crops around the world, primarily in the United States, followed by Argentina and Canada.

Four crops, specifically soybeans, maize, cotton and canola, have been genetically modified and aggressively introduced on the world market. According to industry sources, soybeans, maize, cotton and canola constitute 99% of the world's acreage of GM crops, with soybeans alone covering 60% of the total planted area. In 2004, it was estimated that 56% of the 86 million hectares of soybeans, 28% of the 32 million hectares of cotton, 14% of the 140 million hectares of maize, and 19% of the 23 million hectares of canola planted globally were genetically modified.

Today, most of these GM crops are concentrated in a few countries. During the first seven years of cultivation, between 1996 and 2002, over 90% of the global surface of GM crops was concentrated in just three countries: the United States, Argentina and Canada. In 2004, more than 84% of GM crops were still concentrated in these same three countries, although the areas under cultivation in Brazil, China, and India has grown progressively over the past three years.

The introduction of GM crops has been dominated and promoted by a handful of corporations. Three companies - Monsanto, Syngenta, and Bayer – are responsible for virtually all of the commercially released GM crops in the world today.

Soy in South America. © redes

conflicting views after a decade of experience: a critical analysis of monsanto and isaaa data

The biotech industry and other industry-sponsored organizations like ISAAA claim that the first decade of GM crops has been a clear success for farmers around the world. According to ISAAA, 8.25 million farmers – 90 percent of them in developing countries – have chosen to plant biotech crops, and as a result have reduced pesticide applications, decreased production costs, and enjoyed higher yields and greater profits. In their view, "the experience of the first nine years, 1996 to 2004, during which a cumulative total of over 385 million hectares of biotech crops were planted globally in 22 countries, has met the expectations of millions of large and small farmers in both industrial and developing countries". Monsanto makes similar assertions, claiming that over the past decade, farmers have "increased [the] area planted in genetically modified (GM) crops by more than 10 percent each year," and increased profits as well.

However, criticism of Monsanto's evaluation and the methodology and sources of ISAAA data has been increasing in recent years. ISAAA has not publicly announced the source of its information in any of its annual reports since 1997. In its 1996 report, ISAAA acknowledged that its statistics, particularly for developing countries, are largely gathered "through informal contacts". Hectarage figures are very difficult to estimate accurately without proper official sources, and many governments in developing countries neither keep track of nor monitor the areas planted with GM crops. As a result, verified official statistics cannot be obtained from countries such as South Africa, the Philippines and Brazil.

Analyses by several authors have found ISAAA data on biotech crop area to be vastly inflated. ISAAA's 2002 estimate that South Africa had 100,000 hectares of biotech crops, for example, was 20 times higher than the figure provided by other biotech industry organizations. In the Philippines, ISAAA claimed that it had obtained the figure for the area planted with biotech crops from the government, but the Department of Agriculture there denied that it kept such statistics and one official rejected ISAAA's estimate as superfluous. Even in the United States, it has been reported that ISAAA inflated the figures for GM crop cultivation between 2 and 9% from 2000 to 2004.

TABLE 1

ESTIMATES OF ACREAGE CULTIVATED WITH GM CROPS IN THE USA, 2000 – 2004

YEAR	USDA (1,000 HA)	ISAAA (1,000 HA)	ISAAA – USDA (1,000 HA)	ISAAA – USDA % OVERESTIMATED
2000	28,157	30,300	2,143	7.6%
2001	32,751	35,700	2,949	9.0%
2002	36,948	39,000	2,052	5.6%
2003	40,781	42,800	2,019	4.9%
2004	45,367	47,600	2,233	4.9%

Sources; *LIS Consult, 31 May 2005. Based on NASS – USDA, Prospective Plantings 2000 – 2004 and ISAAA, Global Review of Commercialized Transgenic Crops 2000 – 2004.*

precaution versus celebration

For ISAAA and corporate leaders such as Monsanto, the experience with GM crops since 1996 has constituted a huge success. ISAAA called for celebrations to take place at the end of 2005, on the tenth anniversary of the cultivation of GM crops worldwide: "The 10th anniversary in 2005 will be a just cause for celebration worldwide by farmers, the international scientific and development community, global society, and the peoples in developing and industrial countries on all six continents that have benefited significantly from the technology, particularly the humanitarian contribution to the alleviation of poverty, malnutrition and hunger in the countries of Asia, Africa and Latin America."

Is the analysis by Monsanto and organizations like ISAAA correct? Are the benefits of GM crops as strong as claimed by pro-biotech interests? If GM crops are safe, economically profitable, and environmentally friendly, why then has there been so much opposition, concern and controversy in recent years? If the scenario is so good, if so many millions of farmers and consumers are benefiting, if the increase in GM crops is so impressive, and if poverty, malnutrition and hunger have been alleviated in developing countries, why then have some governments imposed bans and moratoriums? Why are consumers opposing those products in many places around the world?

There is extensive documentation exposing problems with GM crops in farming communities around the world, in the US, Canada, India, Indonesia and other countries. The list is long and growing.

The controversy and the uncertainties surrounding the human health, environmental and socio-economic impacts of GM crops still loom large after ten years. Public opposition on many continents remains strong, and an increasing number of regions are taking steps to prevent their cultivation.

This report examines the introduction of GM crops around the world over the past ten years since 1996. It cites data from a wide range of sources, including scientific, government, industry, and civil society literature. It presents a series of case studies from different continents that expose the significant misrepresentations made by ISAAA and the biotech industry.

When analyzing and evaluating the first decade of widespread cultivation of GM crops, governments, organizations and UN bodies should make sure that they examine the 'untold' story from the ground, which is never incorporated in ISAAA's annual briefings and Monsanto's reports. This report addresses these issues and asks who is really benefiting from the GM crops introduced over the past decade.


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monsanto's strategies

Monsanto is responsible for around 90% of all GM traits used around the world. It has more GM product applications for commercial release than any other company, either directly or indirectly through licensing agreements with local seed companies. One of the company's current priorities is to expand and gain new markets for its GM crops. Monsanto's ambitious plans, if achieved, will have profound implications for the world's food supply, for the environment, for consumers and, in particular, for developing countries.

4.1 expanding the gm seed frontier

Monsanto is at the forefront of constantly pushing for regulatory clearance for its GM products in various countries, in order to maximize profits from the GM seed business.

Towards the end of the 20th century, the seed industry in North America became highly concentrated, with oligopolistic competition among and between a few large firms. In 2005, after acquiring Seminis, Monsanto became not only the global leader in GM crops, but the largest seed company in the world.

Monsanto's estimate of a 25% annual growth up to 2008 is largely based on the rapid adoption of GM seeds throughout the world. The company aims to displace conventional seeds with its patented GM varieties, particularly in soy, corn, canola and cotton. It is striving for a world in which the only agriculture is genetically modified, and predicts that "full adoption of GM crops globally would result in income gains of US$210 billion per year within the next decade, with the largest potential gains occurring in developing countries at a rate of 2.1 percent gross national product per year".

In practical terms, this means that Monsanto's marketing strategy will continue to promote the transformation from conventional to GM seeds. In this scenario, and particularly within the context of Monsanto's dominant seed position, there will be significant implications for farmers in terms of choice and availability of alternatives to what Monsanto has prioritized. Farmers and civil society groups in the US and Africa have already observed that the availability of conventional seed is sometimes reduced in favor of GM crops.

The more hectares that are converted into GM crops around the world, the greater the price per share, and the more Monsanto will benefit. Over the next two years, Monsanto plans to convert at least 100 million acres of the currently available 300 million acres of conventional corn to GM corn. If this happens, Monsanto predicts that it could double its profits by adding over US$2 per share of incremental run-rate earnings. A similar analysis can be made for cotton and soybeans. For cotton, Monsanto calculates that by cultivating 20 million acres more it could increase profits by $0.80 per share of incremental earnings, and in soybeans, 40 million acres more would represent $0.40 more in per share in earnings.

For soy, Monsanto has targeted the world's main producers and exporters: the US, Argentina, Brazil, and Paraguay. While the penetration of Monsanto's Roundup Ready soy was quick in the US and Argentina, regulatory barriers have prevented its debut in Brazil and Paraguay for many years. For maize, Monsanto's main targets are Latin America and Europe; for cotton, the company has targeted India, South Africa, and other Asian countries. While maize imports from the US to Europe have dropped dramatically since the adoption of GM crops, Monsanto's latest investment previsions of November 2005 describe Europe as a potential market, and envision the potential uptake of over 80 million hectares of European maize cultivation over the next five years.

4.2. monsanto's assault on regulatory and policy regimes

Within the paradigm of converting hectares of conventional crops by introducing GM traits in as many countries as possible, Monsanto's offices around the world are doing what they can to fulfil the company's predictions and ambitions. Monsanto and the biotech industry's use of their influence to overcome regulatory hurdles and prevent the adoption of adequate biosafety regimes is well documented. Monsanto has used bribery to gain acceptance of its crops and to obtain regulatory approval; evidence of this has been found in Indonesia, for example, where an investigation by the US Securities and Exchange Commission revealed that over US$700,000 in bribes was paid to at least 140 current and former Indonesian government officials and their family members between 1997 and 2002, financed through the improper accounting of Monsanto's pesticides sales in Indonesia.

The US regulatory system, which is based on the substantial equivalence principle and in which GM crops do not require specific regulation, was designed by biotech industry lawyers. As the former official responsible for agricultural biotechnology at the US Food and Drug Administration affirmed: "in this area, the US government agencies have done exactly what big agribusiness has asked them to do and told them to do". In Brazil, it has been verified that the drafting of the weak biosafety law adopted in 2004 was guided by a lawyer who worked for Monsanto for several years.

4.3 first contaminate, then legalize

Monsanto's products have also penetrated and contaminated areas where the planting of GM crops was forbidden. In Brazil, despite a ban on planting GM soy between 1998 and 2003, the widespread contamination of crops in the south of the country led to the temporary authorization of the 2003 GM soy harvest by the government. In Paraguay, where a ban on GM soy planting was also in place, the de facto contamination led to the authorization of GM soy in 2004. In India, despite the lack of authorization for the commercial release of Bt cotton, contamination was detected in 2002, leading to the approval of GM cotton some months later.

4.4 unethical and irresponsible advertising

Monsanto has used unethical and irresponsible media and advertisement campaigns to gain the confidence of farmers. The National Commission of Indian Farmers has reprimanded biotech companies for their "aggressive advertisement". Intensive marketing through local newspapers, local meetings and television advertisements, using popular actors in some cases, has been used in several Indian states. In Brazil, Monsanto launched an educational program in schools in April 2005, which was eventually halted by the Minister of Culture following public opposition.

Monsanto and pro-biotech organizations are renowned for using so-called 'small farmers' to attest to the success of GM crops. One of the best known is Buthelezi, who is promoted around the world as a poor farmer but in reality appears to be a wealthy South African farmer from the Makhatini Flats (see box). Buthelezi even made an appearance at the launch of the US complaint against the EU at the World Trade Organization in 2003.

ISAAA has used similar 'grassroots' strategies: they supported the work of the so-called Asian Regional Farmers' Network (ASFARNET), which claimed to be a network of farmers from India, the Philippines, Indonesia, Thailand, Malaysia and Vietnam. A background check on these 'farmers' cast some doubt on their professions: Dr. Banpot, the 'farmer' from Thailand, is a high-profile pro-GMO scientist from a public research institution in Thailand, and the 'farmer' from the Philippines, Edwin Paraluman, heads a local irrigators' association in General Santos City but does not appear to belong to any farmers' organization.

farmers: the new biotech pawns

"Buthelezi was by Zoellick's side when the Trade Secretary formally announced a US WTO case against EU restrictions on GM imports. A month later, the Administrator of USAID, Andrew Natsios, described Buthelezi before a Congressional panel on plant biotechnology in Africa. [...] The Council for Biotechnology Information calls him a 'small farmer', and others describe his life as 'hand-to-mouth existence'. Administrator Natsios described him as a 'small farmer struggling just at the subsistence level'. However, independent reporters have revealed that, with two wives and more than 66 acres, he is one of the largest farmers in Makhathini, and chairs the area's farmers' federation encompassing 48 farmers' associations."

Source: De Grassi, 2003.

4.5 challenging farmers' rights: the fight over royalties

In the United States, Monsanto has established a very tough collection regime for royalties on its GM products. The royalty is collected in the form of a 'technology fee', or surcharge for the GM trait, which is paid at the point of seed purchase. This surcharge represents 30% or more of the price of the seed. Farmers are supposed to sign a 'technology use agreement' upon seed purchase stipulating that they are prohibited from saving any GM seed from their harvest for replanting. This 'intellectual property protection' criminalizes the age-old practice of seed-saving, the farmer's most fundamental right. In many cases, however, farmers who never saw or signed this agreement have been sued for violating it, their signatures forged by seed dealers. In other cases, farmers who did not save or replant GM seed have found their fields contaminated with GM traits through cross-pollination from neighboring fields or GM seed blown from trucks.

Soy in South America.

This system aggressively challenges the fundamental rights of farmers around the world: if farmers reuse seeds without paying technology fees, they risk being taken to court and fined. This is the case even if they have not used the seed and their crops have been contaminated through cross-pollination or other means. Thousands of farmers have been investigated by Monsanto: some have settled, but others have landed in court. Most of the farmers who end up in court face a very unbalanced situation, as their legal resources are far less than those of the multi-billion dollar company. In many cases, these farmers cannot afford any legal representation whatsoever and must stand alone in trial against Monsanto.

Since 2003, Monsanto has focused on implementing these intellectual property right practices at the global level. One important reason for this push is Monsanto's need to replace the reduction in revenues from its Roundup herbicide. Since Roundup went off-patent in 2000, the company has been forced to slash its prices to meet competition from generic makers of glyphosate (the active ingredient of Roundup) in Europe and China. With shrinking profits from its chemicals and Roundup Ready sales, and fierce price competition from China and Europe, the company is trying to bring in as much money as possible in the form of royalties derived from its GM traits division, which requires US-like intellectual property laws.

The company's first targets have been the main adopters of GM crops in South America, and several temporary agreements have been reached in Paraguay, Uruguay and some Brazilian states. Monsanto is making deals based on different approaches: collecting royalties either at the time of purchase of GM seeds, or at the delivery of the harvested crop, or both. The company is dealing directly with farmers' organizations, as well as with grain elevators. It is also lobbying for changes in national regulatory regimes, for example in Uruguay, in order to replace farmers' rights to freely save and reuse seeds with new mechanisms to allow private contracts that impose restrictions on such rights.

No deal has yet been made in Argentina, where the government is strongly opposed to this approach. Miguel Campos, the Argentinian Secretary of Agriculture and a strong supporter of GM crops, points out that Monsanto has made a good deal of money in the country and should not impose itself unfairly on Argentine farmers: "The great beneficiary of this has been Monsanto. Argentina has been the launching point for the use of this technology in the continent. This has allowed Monsanto to make advances in other countries".

In June of 2005, Monsanto launched a new phase in its campaign by filing lawsuits against the shipment of Argentine soybean products to the Netherlands and Denmark. The company is claiming the possible infringement of its Roundup Ready patent rights in Europe due to the presence of this gene in imported products derived from GM soybeans.

The controversy over royalties has also been ignited in Asia following complaints from farmers. At the beginning of January 2006, the Andhra Pradesh government filed a petition against Mahyco-Monsanto before the Monopolies and Restrictive Trade Practices Commission for what it considered an "exorbitant" royalty collection for Bt cotton. The Minister of Agriculture of Andhra Pradesh, Mr. N. Raghuveera Reddy, said: "The company – Monsanto – is compelling cotton farmers at gun point to pay the extra amount, even as it collected lesser and variable royalties in other countries."

The increasing power of Monsanto in the seed industry, strengthened by looming corporate intellectual property rights systems for collection of royalties, constitutes a major threat to farmers' rights worldwide. In the countries in which such regimes have been adopted, experience shows that farmers who choose to cultivate non-GM varieties have no legal protection against contamination, and can be sued for the non-intentional presence of transgenic DNA in their crops.

Monsanto's June 2005 property rights claim over soy cake from Argentina signals that the company believes that it has proprietary rights over transgenes not only in its patented seeds but in products derived from these seeds. This is a strong warning of the risks involved in allowing a multi-billion dollar company to continuously expand its crop model. In order to obtain what it considers 'adequate' benefits, Monsanto will need to progressively increase its control over the seed, food, and feed supply of any country in which its products are introduced, to the detriment of the nation's farmers.

Farmers in South Sulawesi, Indonesia burning GM cotton in September 2001.

environmental, social and economic impacts

The biotech industry claims that GM crops in the US have provided "significant yield increases, significant savings for growers, and significant reductions in pesticide use". But as the case studies in this report show, a significant number of studies by independent scientists demonstrate that yields from GM varieties are lower than, or at best equivalent to, yields from conventional crops, contradicting the biotech industry's claims to the contrary. Reduced yields are found with Roundup Ready soy in particular.

Furthermore, independent studies have demonstrated not only that pesticide reduction claims are unfounded, but that GM soy has dramatically increased pesticide use, particularly since 1999. This increase in pesticide applications will be exacerbated by the widespread adoption of Roundup Ready crops around the world. By 2005, six different weeds had reportedly become resistant to Roundup in many countries, not to mention a long and growing list of weeds that have developed a degree of tolerance sufficient to require applications of other, often more toxic, herbicides. The decreasing efficacy of Roundup is largely due to the overuse of this single herbicide as the key method for managing weeds on millions of hectares. This underscores the fallacy of the 'one size fits all' approach so prevalent in modern-day farming.

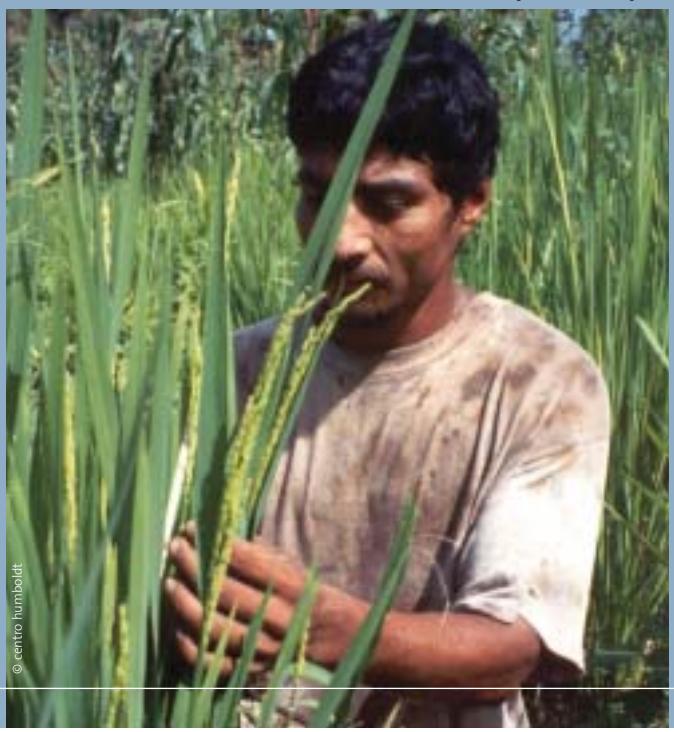
In Argentina, the intensification of soy production has been associated with a decline in soil fertility and soil erosion. It has been predicted that Argentinian soils will be infertile in 50 years if current rates of nutrient depletion and soy production continue. At the same time, soy has displaced other crops such as legumes, fruits, and cattle, which has serious consequences for the country's food sovereignty.

The introduction of GM soy has also contributed to the acceleration of land concentration in Argentina, favoring the establishment of large holdings and the disappearance of smaller farms. During the 1990s, the number of farms in the Pampas declined from 170,000 to 116,000, while their average size doubled. 14 million hectares are calculated to be in debt to banks and big companies.

In 2005, Brazil suffered a drought that caused a 72% reduction in soybean yields in Rio Grande do Sul, where Roundup Ready had been widely adopted. The president of the Rio Grande do Sul seed association explained that crop losses were 25% higher for GM soy than for conventional soy, and the governor of Matto Grosso – which produces 25% of the national soybean crop – announced that the state would not plant GM crops the next year. In the current context, recent reports from Brazil confirm that GM soybean uptake in the country for the 2006 harvest season has been much lower than the 50% uptake forecasted by optimistic industry analysts.

In Paraguay, soy cultivation expels thousands of small farmers from their land each year. Human rights violations and forced evictions of peasant communities by soy landlords have been documented in recent years.

Latin American farmer in a corn field.



who benefits from gm crops?

The GM crops that have been commercialized during the last decade, from 1996 to 2005, have been oriented towards maximizing benefits for the agribusiness and seed industries that control GM traits and the chemical products associated with GM crops. In ten years, the commercialization of just two GM traits – herbicide tolerance and insect resistance – have dominated the market in three major crops: corn, soybeans and cotton.

Over 70% of the total global GM crop area is herbicide tolerant; the rest is insecticide resistant, namely Bt. Most of those crops are earmarked for animal feed or for heavily processed products. In the case of Argentina, only 2% of all GM soy stays in the country; the rest is exported, primarily to Europe and China, for animal feed and other highly processed products.

The feed industry, the main recipient of GM products, has already expressed its lack of preference for GM over conventional soy. The European feed industry stated in 2005 that there is "no direct advantage from the presence of residues of herbicide resistant genes in the products they buy. The industry is therefore not prepared to pay for the use of this technology."

GM products also do not offer advantages to consumers, as they are neither cheaper nor better quality. Even the French biotech industry has stated that the GM crops currently available in the market do not benefit consumers. There are clearly no environmental benefits to GM agriculture, as seen by the fact that the most widely planted herbicide-tolerant varieties increase pesticide use substantially. Furthermore, soy expansion is driving small farmers off the land, fostering the emergence of huge mega-farms, and contributing to deforestation.

Neither have GM crops done anything to ease hunger in the world, despite the continual use of this argument by the biotech industry to promote GM crops. First, GM crops are overwhelmingly grown in and/or exported to the world's rich nations. Secondly, they are fed primarily to animals for meat production and consumption by the well-to-do in the US, Europe, Japan and other wealthy nations. By and large, the poorer farmers of the world cannot afford to purchase imported soybean meal or maize (whether GM or not) to feed their livestock. While GM maize might be exported to some extent to poorer countries for direct human consumption, it offers absolutely no advantage over conventional corn; indeed, Bt corn's insecticidal toxin has not been adequately reviewed to assess its potential impacts on human health. Third, the reduced yields associated with GM crops shrink rather than expand the world's available feed/food supply. In any case, hunger and malnutrition are ultimately caused more by poverty, lack of access to land, illiteracy and poor health care than by deficient agricultural production techniques.

So then, who does benefit from the GM revolution? Taking into account the way in which GM crops have been introduced, the beneficiaries to date are obvious: big agribusiness and the biotech corporations that 'own' the GM seeds and traits. Secondly, some large farmers in exporting countries have received some benefits, although these appear to be more related to greater ease of production and the ability to cover more acres as opposed to an increase in profits per hectare. On the other hand, small farmers in several developing countries – Argentina and Paraguay in particular - have been evicted from their lands by large landowners to make room for a huge expansion in soybean cultivation – most of it GM – for export to mainly richer nations. To the extent that GM crops like Roundup Ready soy facilitate expansion of monocultures, they also reduce a nation's food diversity and security, as seen most dramatically in the case of Argentina.

time to get serious! the need for independent evaluations of gm crops and truly sustainable agricultural approaches

The evaluation of the impacts and the performance of GM crops is a highly complex field, and comprehensive and independent evaluators are required in order to be able to provide an objective analysis. Unfortunately, many governments and international bodies such as the UN Food and Agriculture Organization appear to base their analyses on the work of organizations like ISAAA and other industry-oriented organizations that have contributed to the GM crop hype.

In 2003, ISAAA claimed that "the three most populous countries in Asia – China, India, and Indonesia (total population 2.5 billion and a combined GDP of over US$1.5 trillion), the three major economies of Latin America – Argentina, Brazil and Mexico (population 300 million and a GDP of $1.5 trillion), and the largest economy on the continent of Africa, South Africa (population 45 million and GDP of $130 billion) are all officially growing GM crops for the benefit of their combined population of 2.85 billion with a total GDP of over $3 trillion."

In order to evaluate the validity of such a claim, a series of structural, regulatory, and economic aspects related to the geographical, political, and scientific context of the country and region in which a particular GM crop is to be adopted must be taken into account. Furthermore, a comprehensive assessment of the performance of GM crops requires a full description of short, medium and long-term impacts, whether they be negative or positive. ISAAA's analysis only extols the benefits, without referring to any of the negative impacts derived from the introduction of GM crops. This raises many questions: if so many millions of small farmers from India are benefiting from GM crops, as ISAAA claims, how can the 2005 ban by the government of Andhra Pradesh on the first three varieties of Bt cotton be explained? How does ISAAA account for the protests and complaints by hundred of farmers about the failures and problems associated with Bt cotton in the District of Warangal, and the negative reports from the Department of Agriculture in Maharastra? If half a million people were lifted out of poverty in Indonesia thanks to Bt cotton, as ISAAA claims, why did Monsanto abandon the commercialization of Bt cotton there in 2003? How does ISAAA explain the poor performance of Bt cotton in South Sulawesi? And why did Indonesia disappear from ISAAA's map of countries cultivating GM crops in 2004 without any explanation?

The fact that problems such as these are so often ignored by people in power is a testament to the mania for agricultural biotechnology in some circles. This uncritical enthusiasm for agriculture biotech is fostered by a sophisticated and well-funded public relations effort on the part of the biotech industry, which spends US$50 million per year to promote its products in ways that are often deceitful and unethical. It is also, unfortunately, fostered by the desperate search for silver bullet solutions so common in areas suffering serious rural decline.

As suggested by the many problems with GM crops outlined above, there is an urgent need for a serious independent analysis of proposed biotech 'solutions' to the agricultural problems facing farmers, particularly in developing countries. Even more important, agricultural officials should always begin their analysis with the specific problem to be solved or improvement to be made, not with a single proposed (biotech) solution. A full range of non-biotech approaches should also be evaluated. For instance, the innovative 'push-pull' system of maize cultivation in Africa accomplishes all that Bt maize can, but offers much more, and at much lower cost. This system involves intercropping maize with plants that repel or 'push' insect pests out, together with a border row of another plant that attracts or 'pulls' the same pests out of the field. Besides insect protection, the intercropped plants repel weeds, and can be harvested to feed livestock. The low cost and added benefits make the 'push-pull' system a much better choice than GM insect-resistant maize.

This is just one example, and many others could be mentioned: bio-control of cassava mealybug in Africa, for instance, rescued Africa's staple crop from almost certain devastation in the 1980s, and saved millions of African lives. Today, scientists would probably rather tinker with cassava genes in hopes of coming up with an 'insect-resistant' GM cassava. In many cases, basic infrastructure improvements such as all-weather roads, or decent fencing, can do more to help farmers than any crop modification can.

conclusion

The future of who controls our food hangs in the balance. Monsanto will target major food and feed markets over the coming years in order to expand its global 'genetic footprint' of GM crops. The biotechnology industry as a whole continues to amass control over the food supply through the purchase of seed companies, the acquisition of patents on GM crops and genes, and the persecution of farmers for alleged patent infringement. The aggressive push in South America to adopt new regulatory mechanisms for imposing technology fees is a clear attempt to export North American practices at the global level.

Monsanto and other biotech companies continue to exercise extraordinary influence over governments and their regulatory apparatuses, ushering poorly tested and potentially hazardous products through weak approval processes. Bribery has been used as a tool to overcome environmental risk assessment hurdles, and unethical and immoral media campaigns have been waged. These are all troubling developments that bespeak a profound disconnection between the profit-driven goals of agribusiness and the clear desires of citizens around the world for healthy, sustainable food systems.

Yet there is also much reason for hope. The biotech industry has failed to introduce new second generation GM crops with consumer benefits as planned. After 30 years of research, only two modifications have made it to the marketplace on any scale. The industry's plans to introduce third generation crops engineered to produce experimental drugs and industrial compounds have also been defeated. Understandably, these so-called pharma and industrial GM crops have aroused considerable controversy among citizens and food companies. The biotech industry also seems to be running out of new ideas, with a decline in the number of GM crop field trials and a return to conventional breeding for some of its most promising new crops. Finally, the most vibrant sector of the food industry continues to be organic agriculture, which prohibits the use of transgenic technologies. These developments are clear signs that genetic modification does not need to be the future of food.

The range of possible food futures is suggested by a recent white paper from the US Department of Agriculture's pro-biotech Advisory Committee on Biotechnology and 21st Century Agriculture. Despite its flaws, which include some of the mistaken assumptions that we have critiqued in this report, the paper outlines three scenarios for the future of GM crops: Rosy Future, Continental Islands and Biotech goes Niche. The latter scenario in particular acknowledges the clear possibility that transgenic plant technologies will fade in importance as technical difficulties in the development of multi-gene traits and consumer rejection continue to block the introduction of new GM varieties. On the other hand, the successful products of organic agriculture and smart non-transgenic breeding approaches that employ our expanding knowledge of genomics (e.g. marker-assisted breeding) are eagerly accepted by consumers around the world. The future of food is ultimately a democratic decision that will be decided by each and every one of us.

Landraces varieties of Mexican maize, Oaxaca, Mexico.

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