who benefits from gm crops?

feeding the biotech giants, not the world's poor

february 2009 | issue 116 summary

Friends of the Earth International

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our vision is of a peaceful and sustainable world based on societies living in harmony with nature. We envision a society of interdependent people living in dignity, wholeness and fulfilment in which equity and human and peoples' rights are realized.

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authors Juan Lopez Villar, Bill Freese, Helen Holder, Kirtana Chandrasekaran and Lorena Rodriguez

editorial team Helen Holder, Kirtana Chandrasekaran, Pascoe Sabido

proofing and editing Helen Burley, Hannah Abbott

design Tania Dunster, **one**hemisphere, tania@onehemisphere.se

printing www.beelzepub.be

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friends of the earth
international secretariat

P.O. Box 19199
1000 GD Amsterdam
The Netherlands
Tel: 31 20 622 1369
Fax: 31 20 639 2181
info@foei.org
www.foei.org

executive summary

The biotechnology industry has aggressively touted GM as a solution to hunger and the global food crisis.[1] Their arguments have been accepted by many politicians.[2] This short briefing is a summary of a new Friends of the Earth International (FoEI) report that looks behind the spin and exposes the reasons why GM crops cannot, and are unlikely ever, to contribute to poverty reduction, global food security or sustainable farming:[3]

- *Firstly, hunger is chiefly attributable to poverty, not to a lack of food production. For small farmers, this means a lack of access to credit, land, inputs and technical support as well as declining investment in agriculture by governments. For urban dwellers, it means not having enough money to purchase increasingly expensive food.*
- *Secondly, the vast majority of GM crops are not grown by, or destined for, the world's poor. They are used for animal feed, biofuels, or highly processed food products in rich countries. Most commercial GM crops are grown by large farmers in a handful of countries (Brazil, Argentina and the US) with industrialised, export-oriented agricultural sectors.*
- *Thirdly, it is widely accepted that GM crops do not increase yield, and in some cases yield less than conventional crops.*
- *Fourthly, official data from major producer countries – US, Argentina and Brazil – confirms that pesticide use increases with GM crops, including the use of toxic chemicals banned in some European countries. This raises costs for farmers and also causes agronomic, environmental and health problems, mostly affecting poor communities who live near intensive GM farms.*
- *Fifthly, the real beneficiaries of the GM system are biotech companies which profit from patents, expensive GM seeds, and increased pesticide sales. Poor farmers in contrast are squeezed by escalating costs.*

gm crops: what is grown?

GM crops on the market incorporate essentially just two "traits" – herbicide tolerance and/or insect resistance. Insect-resistant or Bt cotton and corn produce their own built-in insecticide derived from a soil bacterium, *Bacillus thuriengiensis (Bt)*, to protect against certain (but far from all) insect pests. Herbicide-tolerant crops are engineered to withstand direct application of an herbicide to more conveniently kill nearby weeds. Crops with herbicide tolerance predominate, occupying 82% of global biotech crop acreage in 2007.

Despite the GM hype built up by the industry during the food crisis, there is still not a single commercial GM crop with increased yield, drought-tolerance, salt-tolerance, enhanced nutrition or any of the other 'beneficial' traits long-promised by the industry. Disease-resistant GM crops are practically non-existent, and are grown on a tiny scale.

what is the status of gm crops in the world today?

First introduced 15 years ago, GM crops are still confined to a handful of countries with highly industrialised, export-oriented agricultural sectors. Nearly 90% of the area planted to GM crops in 2007 was found in just six countries in North & South America, with 80% in the US, Argentina and Brazil. One country alone, the United States, plants over 50% of the world's GM crops. Less than 3% of cropland in India and China is planted with GM crops, almost exclusively GM cotton.[4] In the 27 countries of the European Union, GM crop cultivation represents a mere 0.21% of agricultural land.

Soybeans.

Cotton farmer, India.

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exposing *who* does *benefit* in times of "food crisis"

The global food crisis has already pushed the number of hungry and poor to 1 billion[5] but agribusiness corporations[6] have increased their profits hugely during the same period. The Monsanto Company is particularly well-positioned to profit from the food crisis. Monsanto is the world's largest seed firm, holds a near monopoly in the biotech "traits" incorporated in GM seeds, and markets Roundup, the world's biggest selling pesticide. Thus, Monsanto is expected to increase its total revenue by a substantial 74% from 2007 to 2010 (from $8.6 to $14.9 billion). The corporation's net income (after tax) has been projected to triple over the same period, from $984 million to $2.96 billion.[7]

This is because as agricultural commodity prices have spiralled upwards, big farmers growing export crops like GM soy and maize for international markets have been receiving more for their crops. This has allowed Monsanto and other companies to raise seed and pesticide prices exponentially, ensuring that farmers who have long suffered from low world prices for their crops do not benefit from any price rises. However, price increases began even before the sharp rise in agricultural commodity prices. This is part of an aggressive profit-maximizing "trait penetration" strategy whereby Monsanto rapidly phases out more affordable seed varieties in favour of new GM seeds with an increasing number and the latest generation of traits, and corresponding increases in seed prices.

gm seed price increase: no end in sight

In the US the average price of soybean seed has increased more than 50% over the last two years, and further increases are expected as Monsanto rolls out a new more costly version of their patented 'Roundup Ready'[8] soybeans (called RoundUp Ready 2) in 2009. At the quoted prices, the increased cost for US soybean farmers who replace just 50% of original RR with RR2Y soybeans would come to a substantial $788 million, much of which will accrue to Monsanto.

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Bt Corn field, Nebraska.

Meanwhile, US farmers report increasing difficulties finding quality conventional (non-GM) soybeans.[9]

Monsanto is also substantially raising the prices for all types of its GM corn seed – whether single-trait, double-trait or so-called triple stack corn.[10] The price of Monsanto's triple-stack corn will reportedly increase by $95-100 per bag, to top $300 per bag in 2009 (Guerbert, 2008). The company has also raised its trait prices for its less expensive single and double-stack corn seed more sharply than for triple-stack corn in order to "move as many customers to triple stacks as possible," creating "a captive customer base for the 2010 launch of its SmartStax octo-stack product."[11]

pesticide price hike

Retail prices in the US for Roundup have increased by 134% in less than two years. Monsanto controls roughly 60% of the market for glyphosate (the active ingredient of Roundup), which in 2006 was estimated at $3.8 billion.[11] This means about $2.3 billion in 2006 sales revenue from Roundup. The 134% retail price hike since late 2006 is likely to bring Monsanto hundreds of millions of dollars in additional revenue from its flagship herbicide.[12]

In Argentina, by the end of 2007, increased agrochemical demand[13] coincided with rising glyphosate prices, which have climbed substantially in comparison to the prices of herbicides used on conventional crops.

Monsanto is also driving greater use of Roundup by incorporating the Roundup Ready trait in nearly every GM seed it sells. US farmers who once bought GM maize modified only to be resistant to insect pests (Bt crops) now find these varieties "stacked" with the Roundup Ready herbicide resistance trait as well. As a result, in the US , the area planted with Monsanto GM maize seed without the Roundup Ready trait fell dramatically from 25.3 million acres in 2004 to just 4.9 million acres in 2008. This "trait penetration" strategy means higher profits from both seeds and Roundup sales, and ensures farmers' dependence on GM traits and Roundup.

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Corn harvest, Africa.

gm crops increase pesticide use

Over a decade of experience in the US, Argentina and Brazil demonstrates that GM crops have contributed substantially to rising pesticide use and an epidemic of herbicide-resistant weeds. Resistant weeds have prompted biotechnology firms to develop new GM crops that tolerate heavier applications of chemicals, and tolerate two herbicides rather than just one, promoting pesticide use even further. The use of mechanical tillage to control resistant weeds is also increasing, contributing to greater soil erosion and global warming gas emissions.

In the US, when GM crops were first grown, the rising use of glyphosate on Roundup Ready crops was more than offset by reductions in the use of other pesticides. As of 2000, however, weeds that could no longer be controlled with the normal dose of glyphosate began to emerge, driving farmers to apply more. Thus, the widespread adoption of Roundup Ready crops combined with the emergence of glyphosate-resistant weeds has driven a more than 15-fold increase in the use of glyphosate on major field crops from 1994 to 2005. The trend continues. In 2006, the last year for which data is available, glyphosate use on soybeans jumped a substantial 28%, from 75,743 million lbs in 2005 to 96,725 million lbs in 2006.[14]

More and more farmers are being told – by agronomists and by Monsanto[15] - to combat glyphosate-resistant weeds by applying other chemicals, such as paraquat, diquat and atrazine, often in combination with higher rates of glyphosate.[16] USDA pesticide data confirm this trend: rising glyphosate use even while use of other more toxic herbicides also increases, or at best remains constant.

In Argentina, overall glyphosate use has more than tripled from 65.5 million litres in 1999/2000 to over 200 million litres in 2005/6.[17] In 2007, agricultural experts reported that a glyphosate-resistant version of Johnsongrass *(Sorghum halapense)* was infesting over 120,000 ha of the country's prime cropland. Johnsongrass, an extremely damaging perennial, is a monocot weed that is considered one of the worst weeds in the world, and resistance to glyphosate will make it all the more harder to control.

The emergence of glyphosate-resistant Johnsongrass is directly attributable to the huge increase in glyphosate use associated with near total dependence on Roundup Ready soybeans in Argentina. The main recommendation to control resistant weeds is to use a cocktail of herbicides other than glyphosate, including more toxic weedkillers such as paraquat, diquat and triazine herbicides such as atrazine.[18] It is estimated that an additional 25 million litres of herbicides will be needed each year to control resistant weeds, resulting in an increase in production costs of between $160 and $950 million per year.[19]

In Brazil, government agencies show that the consumption of the main active ingredients in the most heavily used soya herbicides increased by 60% from 2000 to 2005. Use of glyphosate grew 79.6% during this period, much faster than the increase in area planted to Roundup Ready soya.[20]

Several factors make it virtually certain that the number of weeds resistant to glyphosate and their prevalence will continue to rise dramatically in the future. These factors include: 1) More planting of glyphosate-tolerant crops in rotation (every year) 2) Continuing dramatic increases in the use of glyphosate; 3) New glyphosate-tolerant crops on the horizon, including some that are engineered to withstand higher doses of glyphosate. As a result, overall use of toxic weedkillers to kill increasingly resistance weeds is bound to increase, with adverse effects on human health (especially farmworkers) and the environment.

do gm crops increase yield?

None of the GM crops on the market are modified for increased yield potential. Corporations' research and product pipelines continue to focus on new pesticide-promoting varieties that tolerate the application of one or more herbicides. For instance, of the 14 GM crops awaiting USDA commercial approval, nearly half (6) are herbicide-tolerant: corn, soybeans, cotton (2), alfalfa and creeping bentgrass (for golfcourses). None of the others represent beneficial new traits. Corn and cotton with insect-resistance are minor variations on existing IR crops. Virus-resistant papaya and soybeans with altered oil content are already approved, though not grown to any significant extent. Carnations engineered for altered colour are a trivial application of biotechnology. One GM corn is engineered for sterile pollen, while another engineered to contain a novel enzyme for "self-processing" into ethanol presents potential risks to human health.

The US Department of Agriculture (USDA) admits that genetic engineering has not increased the yield potential of any commercialised GM crop.[21] In 2001, University of Nebraska agronomists attributed a six per cent yield drag directly to unintended effects of the genetic modification process used to create the Roundup Ready soybean.[22] Yield-lowering effects of this sort are a serious, though little-acknowledged, technical obstacle to genetic engineering, and are one of several factors foiling efforts to develop viable GM crops with drought-tolerance, disease-resistance and other traits.[23]

A six per cent yield drag corresponds to the substantial loss in production of 160 lbs/acre. By one estimate, this drag on soybean yields cost US soybean farmers $1.28 billion in lost revenues from 1995 to 2003.[24]

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The largest global assessment of agricultural science (IAASTD)[25], endorsed by 58 governments, corroborated this, concluding that:."The application of modern biotechnology outside containment, such as the use of GM crops is much more contentious. For example, data based on some years and some GM crops indicate highly variable 10-33% yield gains in some places and yield declines in others" (Synthesis Report summary, p.14) and that: "The impacts of transgenic plants, animals and microorganisms are currently less understood. This situation calls for broad stakeholder participation in decision making as well as more public domain research on potential risks." (Global Summary, p. 20).

why do some farmers still grow gm crops?

Herbicide-tolerant crops (mainly soybeans) are popular with larger growers because they simplify and reduce the need for labour for weed control (Duffy, 2001). This labour-saving effect explains the appeal of the world's most widely planted GM crop, Roundup Ready soybeans, which have facilitated the worldwide trend to concentrate farmland in fewer, ever bigger, farms[26] putting small farmers out of business and creating rural unemployment and poverty. This confirms the attraction of GM crops for large farms and landowners who target export markets.

Why do farmers grow GM herbicide-tolerant soybeans if they don't deliver increased yield and/or income? For some, reduced yields are accepted as the price to be paid for simplification and labour-saving in weed management, which are especially attractive to larger growers. There are, however, increasing cases in the US where farmers would prefer to grow non-GM crops but find it increasingly difficult to find high-quality conventional seeds.

According to the Argentine Sub-Secretary of Agriculture, this labour-saving effect means that only one new job is created for every 1,235 acres of land converted to soybeans. The same amount of land, devoted to conventional food crops on moderate-size family farms, supports four to five families and employs at least half a dozen people.[27]

conclusion

We are facing an unprecedented crisis in the global food system with rising numbers of hungry people in the world, even though we produce more than enough food to feed the world. Meanwhile, increasing control of the world's seed supply by biotech companies enables them to garner record profits, even as millions are starving. Clearly, we need a fundamental shift in food and agriculture policy. Our goals should be to ensure fair access to land, credit and training to help the world's small farmers (who comprise more than 2/3 of the world's most poor and hungry) produce more to feed themselves and their communities, and to ensure that the world's urban poor have access to affordable food.

The GM farming model will not achieve these goals. GM crops mean extremely costly seeds and increasing use of expensive chemicals, both of which are well beyond the means of most small farmers in developing countries. The model of GM farming favors larger, wealthier farmers, and will deepen their dependence on high energy and resource use at a time of rising climate emissions and resource depletion. This is not how poverty, hunger and the food crisis are going to be solved.

The most promising means to achieve these goals were laid out by the first International Assessment of Agricultural Science and Technology for Development (IAASTD), a four-year effort sponsored by the United Nations and World Bank. The IAASTD, which involved 400 experts from 58 countries, released its preliminary report in the spring of 2008. This exhaustive analysis by experts from many disciplines found that the best way to fight global hunger was by returning to ecologically sound, low-input, low-cost farming methods.[28] The same study found that GM crops offered very little potential for alleviating poverty and hunger, which helps explain why several biotech companies withdrew from the study.

The approaches favoured by IAASTD included agro-ecological farming techniques, looking at the wider benefits of agriculture in terms of ecosystems, landscapes and culture. Local knowledge was promoted as crucial for developing appropriate farming methods. The report also urged a reduction in agricultural subsidies in rich nations and reform of unfair trade rules. Together, these could provide a way of developing sustainable agriculture, including wider employment opportunities, enhanced rural livelihoods and ultimately greater yields, reducing hunger and poverty.

Left: Soy field in the agricultural area of Londrina, in the state of Parana, Brazil.
Right: Bayer Crop Science sign, Paraguay.

isaaa's inflated figures

Every year, the International Service for the Acquisition of Agri-Biotech Applications (ISAAA) publishes figures on the cultivation of genetically modified (GM) crops around the world. Funded largely by the biotech industry, the ISAAA figures are frequently inflated and poorly referenced, if at all. In last year's report, for example, the ISAAA more than doubled the increase in GM crops worldwide to 22% by multiplying the actual surface area by the number of GM traits in the crops. So, for a field of one hectare growing a GM crop which is tolerant to two herbicides and secretes insecticide toxin (three traits) suddenly becomes three fields, and ISAAA therefore triples its figures for the area under GM crop cultivation.[29]

The ISAAA justifies this inflation of the figures as "more accurate[ly] account[ing]" for the use of different types of GM crops. This rather desperate and nonsensical approach is most likely because the area under crop cultivation worldwide, 114.3 million hectares, is a mere 2.4% of global agricultural land and because key markets like the European Union have resoundingly rejected GM foods. The ISAAA report is a PR strategy to pressure governments, and to convince investors, that GM crops are a success.

Each year, Friends of the Earth International publishes a nuanced, fully-referenced, fact-based assessment of GM crops around the world, designed to clear up common misconceptions about their nature and impacts. In this 2009 edition, we report on new trends and findings, particularly the failure to tackle hunger or solve the food crisis with GM crops. We also address the rise in pesticide use and lack of yield increase which is now widely observed with GM crops, and we provide an overview of the continuing failure of GM crops in Europe.

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Spraying fields.

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