

## Food Security: Empty promises of technological solutions

ANURADHA MITTAL

**ABSTRACT** *Anuradha Mittal questions if nano-technology is going to provide the next revolution in food and agriculture industry. This powerful new technology is being rushed on to the market by corporations before even basic safety concerns can be addressed. However, she points out there are many downsides in relation to health and environmental threats that are not taking into account by the world's largest food and beverage corporations pushing nano-technology based solutions*

**KEYWORDS** *biotech; GMOs; nano-technology; genetic engineering; food sovereignty; hunger; development*

### Introduction

In October 2002, the Zambian government turned down the offer from the US Agency for International Development (USAID) of genetically modified food aid, after the Zambian president sent a delegation to South Africa, Europe, and the US to assess the risks associated with the crops, by the Zambian president, concluded that GM food posed too great a risk to be accepted.

The pro-GM lobby did not take well to this. 'Better Dead than GM Fed?' was the derisive response of *The Economist*. Tony Hall, US ambassador to the United Nations food agencies, claiming that Africa was on the verge of a catastrophe with its food crisis worsening, he accused 'well fed' European experts and lobbyists of being selfish, ignorant Luddites for their opposition to US food aid. All of it has passed US food safety and environmental impact testing – the most rigorous in the world. For this reason, US biotech and non-biotech foods are mixed together. We do not, and see no need to separate them', he claimed (Hickey and Mittal, 2003: 1).

Ambassador Hall's statement involves a degree of official amnesia. Consider for example, the statement made by Phil Angell, Director of Corporate Communications at Monsanto. 'Monsanto should not have to vouchsafe the safety of biotech food ... . Our interest is in selling as much of it as possible. Assuring its safety is the FDA's job' (<http://select.nytimes.com/search/restricted/article?res=F2091EF93F590C768EDDA90994D0494D81>, accessed 17 July 2006). Or consider the StarLink corn controversy that rocked the US' food supply system in September 2000. Made by Aventis Crop Science and only approved for animal feed due to concerns that it might cause allergic reactions

## Development 49(4): Thematic Section

in humans, the StarLink biotech corn slipped into the US food supply, sparking a nationwide recall of more than 300 kinds of corn-based products. In December 2002, traces of unapproved StarLink corn were found in a US shipment bound for Tokyo's markets. In November 2002, traces of corn genetically engineered (GE) to produce an edible vaccine to protect piglets from diarrhoea were found in the autumn soy harvest in November 2002 – mixed with beans that would soon be processed into dozens of groceries, from ice cream to salad dressing.

### Conveying a false sense of need, urgency, and safety

In the developing world, where food security is a much more pressing concern, genetically enhanced crops have been seen as a way to increase yields from the existing arable land. GM crops can help subsistence farmers provide more and better foods for their families or, in the case of revenue crops such as cotton, get more value from their land by increasing yield. Also, crops could be enhanced through biotechnology to contain more nutrients and help minimize the effects of malnutrition. Most importantly, GM crops can help provide these benefits in a sustainable way, so that increasing populations can be fed without placing additional pressure on natural habitats by destroying them for farming uses. (Frequently Asked Questions About Agricultural Biotechnology, <http://www.syngenta.com/en/about.syngenta/biotech.faq.aspx>, accessed 14 July 2006).

The domestic failure of regulatory agencies in the US to safeguard the interests of the consumers, sustainable food producers, and the environment, has not prevented the industry from conducting a concerted international pro-GM campaign, creating a false sense of need and urgency. The key arguments used in this pro-industry publicity blitz are 'poor washing' – we must accept GE foods if we are to feed the poor in the Third World – and 'green washing' – biotech will create a world free of pesticides and increase yields.

### Poorwashing: Technological solutions to hunger?

Biotech companies claim that GE food will help feed the hungry in the world. Widespread and persistent hunger is a fundamental contradic-

tion in today's world when production and productivity in agriculture have grown faster than demand (Mousseau and Mittal, 2005). GE crops will not reverse hunger in the Third World because the problem is not overall scarcity but unequal access. The fact that almost 78 per cent of countries that report child malnutrition are food-exporting countries gives rise to the paradox of plenty. According to the Food and Agriculture Organization (FAO), the food is there.

World agriculture produces 17 per cent more calories per person today than it did 30 years ago, despite a 70 per cent population increase. Work in FAO shows that world agriculture can produce enough to feed humanity in the future without putting excessive pressure on prices or the environment. The existence of 780 million chronically hungry people in the developing world today shows that there is something fundamentally wrong in the distribution of food and the resources with which to access it (FAO, 2002: 9).

A striking example of the promise of a technological solution to hunger is Golden Rice. (<http://www.gene-watch.org/genewatch/articles/18-3Mittal.html>, accessed 1 July 2006.) Six years ago, when opposition to GE food began to pick up steam around the world, the biotech industry mounted a \$50 million-a-year public relations campaign to extol the virtues of biotechnology, especially developments like Golden Rice, for their potential to improve world health and eradicate hunger. Syngenta's new version of GE rice supposedly has a tenfold higher content of beta-carotene, which could fight Vitamin A deficiencies that cause blindness among children and adults in developing countries. Aggressively advertised as a miracle grain to end suffering for millions around the world, Golden Rice was promised by corporate public relations to be put in food bowls across Asia.

Six years later, with millions of dollars spent and false hopes raised, this technological promise by the biotech industry has only distracted attention and funding from what could be real, sustainable solutions to malnutrition. World health officials have concluded that poverty, not a lack of modern technology, is the fundamental cause of malnourishment. They also point out that nutritional deficits can be easily and cheaply

corrected with a more varied diet. Green leafy vegetables, oranges, and red palm oil all are high in beta-carotene.

Six years ago, developers of this grain had been vague on how much Golden Rice a person would have to eat to get enough beta-carotene for the recommended daily vitamin A requirement. The data shows that in order for those most vulnerable to this form of blindness, infants, to get enough vitamin A from breast milk, their mothers would have to consume several pounds of cooked rice per day. An adult male would need to eat a smaller, but equally unlikely, amount of cooked golden rice to meet his daily vitamin A requirement. The newer iterations of Golden Rice further reduce the number of pounds of rice a person would need to eat to meet their vitamin A requirement, but still do nothing about a more basic problem. The body can only convert beta-carotene into vitamin A if the diet includes adequate amounts of fat and proteins. The malnourished people whom Golden Rice is supposed to help, however, are by definition also lacking fat and protein in their diets (Greenpeace Briefing Packet, 2005).

Any lingering illusion of altruism on the part of biotechnology companies dims when the subject of patents is raised. As with any product of scientific research with a large market potential, the methods and techniques used in the process are heavily patented; the production of Golden Rice requires 70 of them. Licensing rights stemming from this proprietary information can mean huge profits. So, when Syngenta, which owns many of the patents on the rice, claims that 1 month of marketing delay would cause 50,000 children to go blind, it is not acting out of corporate big-heartedness or concern for these children. It is just doing what big business does best: looking out for the bottom line.

### **Greenwashing: Increasing yields without pesticides and increasing costs**

In March 2006, India and US entered an agreement on farm research and education. Known as the India–US Knowledge Initiative on Agricultural Education, Research, Services and Commercial Linkages, the agreement is about the US and India

conducting joint research in transgenic crops, animals, and fisheries. Andy Mukherjee, a columnist for Bloomberg.Com enthusiastically announced,

If the nuclear deal promises relief for India's power-starved industrial sector, the agricultural agreement has the potential to transform the nation's poverty-ridden countryside. The economics are simply unbeatable... Cotton production has been transformed since Monsanto was allowed to sell its GM cotton seeds to farmers in 2002. (<http://www.bloomberg.com/apps/news?pid=10000039&sid=a5Y1sbpn3vTA&refer=columnist.mukherjee>, accessed 2 April 2006)

Indeed, Bt cotton has transformed both the cotton production and lives of farmers in India. While the Indian government is busy opening its vast network of public sector agricultural research institutes to US private companies, the first 9 days of March 2006 were marked with 25 farmers taking their own life in Maharashtra's cotton growing district of Vidarbha. By 14 April 2006, an estimated 443 farmers in the region had committed suicide to escape indebtedness since the start of the agriculture season on 2 June 2005.

### **What is driving this rash of suicides?**

Last December, *India Together* reported on the suicide of Ramesh Rathod in the village of Bondgavhan, Vidarbha. (<http://www.indiatogether.org/2006/mar/agr-counting.htm>, 6 accessed April 2006) He had purchased Bollgard brand MECH 162 variety from companies with commercial licence from Mahyco/Monsanto for Rs 1800 (\$36) per 450 g, compared with Rs 450 (\$9) that farmers pay for non-Bt seeds.

Ramesh's hopes were dashed when his Bt cotton crops had a severe pest attack and the leaves of his cotton plants turned red before drying up. After having spent a lot of money on inputs and the yield destroyed irreparably, he was in no position to pay back the loans he had taken out. Left behind to pay back the debt and shoulder the responsibility of a family including a young son and a daughter, Ramesh's grieving widow, Dharmibai, used Endosulphane and Tracer – two costly pesticides – against the bollworm pest, but the three

## Development 49(4): Thematic Section

acres of land did not even yield three quintals of cotton.

In April AFP reported the suicide of 34-year old Indian cotton farmer Chandrakant Gurenule. He too had bought the genetically modified cotton seeds for his 15-acre (six-hectare) farm, only to watch his crops fail for two successive years. When there was no hope left, despite him selling off the pair of bullocks he used to plough the fields, and pawning his wife's wedding jewellery, he doused himself in kerosene and lit a match on 1 April 2006.

It is estimated that more than 4100 farmers committed suicide in the western state of Maharashtra in 2004. Increasing cost of production along with sliding global prices and dumping of cheap subsidized cotton from outside the country has been compounded by failure of Bt seeds. Devastated by bollworm pest, Bt crops have been attacked by 'Lalya' or 'reddening' as well, a disease unseen before which affected Bt more than the non-Bt cotton crop, resulting in 60 per cent of farmers in Maharashtra failing to recover costs from their first GM harvest. Some studies show that farmers are spending Rs 6813 (\$136.26) per acre compared to Rs 580 (\$11.6) on non-Bt cotton since GE cotton requires more supplemental insecticide sprays. It is this failure of the Bt cotton that resulted in the Genetic Engineering Approval Committee (GEAC) of India banning Mech 12, Mech 184, and Mech 162 varieties in Andhra Pradesh while Mech 12 was banned all over Southern India. (<http://www.outlookindia.com/full.asp?fodname=20060501&fname=Farmers+%28F%29&sid=3&pn=1>, accessed 10 April 2006)

### Nano-technology: Another revolution in the countryside

From soil to supper, nanotechnology will not only change *how* every step of the food chain operates but it will also change *who* is involved. At stake is the world's \$3 trillion food retail market, agricultural export markets valued at \$544 billion, the livelihoods of some 2.6 billion farming people and the well-being of the rest of us who depend upon farmers for our daily bread. Nanotech has profound implications for farmers (and fisher people and pastoralists) and for food sovereignty worldwide. Agriculture may also be

the proving ground for technologies that can be adapted for surveillance, social control and biowarfare. (<http://www.etcgroup.org/article.asp?newsid=485>, accessed 20 July 2006)

Nano-technology, involving the manipulation of matter at the scale of atoms and molecules, where size is measured in billionths of metres, is being touted as the next revolution in the food and agriculture industry. Most of the world's largest food and beverage corporations – including Unilever, Nestlé, and Kraft – are conducting research and development on nano-scale technologies to engineer, process, package, and deliver food and nutrients. Major agribusiness firms, such as Syngenta, BASF, Bayer, and Monsanto are reformulating their pesticides at the nano-scale to make them more biologically active and to win new monopoly patents. It is estimated that over the next two decades, the impacts of nano-scale convergence on farmers and food will exceed that of farm mechanization or of the Green Revolution (ETC Group, 2004).

Just like the biotech industry, the nano-tech industry promises to feed the world and eradicate poverty. Similar to the GM crops, this powerful new technology is being rushed on to the market by corporations before even basic safety concerns can be addressed. Despite the fact that health and environmental threats can occur from the production, use and disposal of nano-particles, a handful of food and nutrition products containing invisible and un-labelled nano-scale additives are on supermarket shelves and a number of pesticides containing nano-scale materials have been released in the environment and are commercially available.

It is known that ultrafine (nano) particles in air pollution can be up to 50 times more damaging to lung tissue than fine particles of the same chemicals. Scientists believe that ultrafine particles are more toxic due to both their small size and their ability to carry loads of toxic metals and hydrocarbons into the lungs, exacerbating breathing problems and asthma. Nano-particles can also damage the body's natural defenses or, conversely, cause increased responses to common allergens. They can also lead to the formation of free radicals, highly reactive elements that can

damage or destroy cells and cause inflammation, heart and lung disease. In a summer 2002 study, fifteen per cent of rats exposed to nano-tubes in the lungs unexpectedly died immediately, and a 2004 study showed damage to the brain in fish exposed to nano-particles. In the absence of long-term studies, little is known about the environmental persistence or impact of engineered nano-particles and it is difficult to predict which of these new materials may bioaccumulate and persist (Margulis, 2005).

It is the small farmers and agricultural workers in the developing world, however, who would be most adversely affected by nano-technology. ETC Group notes that

Poor farmers are seldom in a position to respond quickly to abrupt economic changes. Particularly at risk are farm communities and countries in the global South that depend on primary export commodities such as rubber and cotton – products that could be displaced by new nanotech materials (ETC Group, 2004).

However, the federal agencies do not seem eager to slow the industry. A Food and Drug Administration presentation states that ‘to date there have been no issues with current products as a result of size’ and alarmingly claims that ‘existing pharmtox tests are probably adequate for most nano-products’ (<http://www.fda.gov/nanotechnology/OhioNano.ppt#1>, accessed 17 July 2006). The Environmental Protection Agency is just starting a process to consider the risks of engineered nano-particles under its outdated chemical regulations (the 1976 Toxic Substances Control Act), and setting up a ‘voluntary pilot program’ for assessing currently or imminently marketed nano-materials (<http://www.epa.gov/oppt/npptac/nanowgoverviewdraft050921finalv2.pdf>, accessed 18 July 2006). In the meanwhile the US Patent and Trademark Office has established a new classification for nano-technology patents. ETC Researcher, Kathy Jo Wetter notes

‘It’s ironic that a company can win a monopoly patent because their nano-scale product is recognized as novel, but food and safety regulators have yet to acknowledge the novelty of the nano-scale’ (<http://www.voyle.net/Nano%20Debate/Debate2004-0022.htm>, accessed 12 July 2006).

The insurance industry’s concerns are, however, important. Both Allianz Insurance and Swiss RE have developed briefings that point to the hazards and lack of regulations and call for minimizing exposures and note that some nano-technologies may be excluded from coverage (<http://www.allianz.com/AzCnt/az/.any/cma/contents/796000/saObj.796424.allianzstudy.Nanotechnology.engl.pdf>, accessed 15 July 2006). The Royal Society, the leading organization of scientists in the UK, has warned that new nano-materials should be tested as new materials, that environmental uses of nano-particles should be prohibited and that any nano-particles escaping from factories should be treated as hazardous. The Royal Society also recommends that any products containing nano-materials be labelled for consumers.

### **The turning tide**

Given the environmental and health risks and concerns around the impact of such technologies on small farmers and developing countries, there is a need for a wide debate and true public participation from all sectors, including farmers, civil society organizations, and social movements.

Developments in technology without transparency and safeguards, and with the rush to market new products that may cause serious economic, health and environmental problems, will generate a public backlash. The industry can choose to dismiss concerns around safety, environmental risks, intellectual property rights and corporate ethics. However, it cannot ignore the possibility that its customers, including farmers and consumers, may not be as willing to dismiss these concerns.

Civil society organizations such as ETC Group have demanded that all food, feed, and beverage products incorporating manufactured nano-particles be removed from the shelves and new ones be prohibited from commercialization until companies and regulators have shown that they have taken nano-scale property changes into account. Similarly, nano-scale formulations of agricultural products such as pesticides and fertilizers should be prohibited from environmental release until a regulatory regime specifically designed to

## Development 49(4): Thematic Section

examine these nano-scale products finds them safe (ETC Group, 2004).

Innovest Strategic Value Advisors (a financial services leader in analyzing the economic impact of environmental and social issues), in a report commissioned by Greenpeace, warned shareholders that Monsanto, the world's leader in developing and marketing GE seeds, is facing substantial market risks that could threaten future earnings of the company due to genetic contamination, sustained market rejection both in the US and abroad, competition and product failures (<http://www.greenpeace.org/international/press/releases/monsanto-investors-face-catast>, accessed 20 July 2006).

Concerned over the adverse impact of Bt cotton cultivation in India, farmers burnt huge stacks of the harvested produce in Maharashtra on 11 May 2006. Krishan Bir Chaudhary, Executive chairman of Bharat Krishak Samaj, the largest farmers organization in India, said, 'We had to take this step to bring to the knowledge of the government and biotech companies that farmers will no longer bear the injustice caused due to failure of Bt cotton'. In March 2005, more than 3000 tribal women participated in seed satyagraha, or non-violent resistance, in Orissa, India. Around the bonfire of hybrid and genetically modified seeds

of cotton and other crops, they shouted slogans damning the GM seeds and the high-yielding crops that have pushed them into poverty, indebtedness and hunger. Their demand to make Orissa an organic state followed 200 villages in the tribal belt of the area that have already declared themselves 'organic villages' and are cultivating indigenous seeds on more than 17,000 acres.

The opposition in the developing world is matched by growing resistance in the US. Mendocino, Marin, Trinity, Santa Cruz counties in California and Brooklin in Maine have declared their municipality a Genetically Modified Organisms (GMO) Free Zone. Recently, the Sierra Club, the largest grassroots environmental organization in the US, together with the Sierra Club of Canada, sent a letter to the World Bank challenging its involvement, together with the Global Environmental Facility, in biotech 'harmonization' programs in Africa and Latin America.

It is time for corporations to accept that food and agriculture are sacred for farmers and communities worldwide. In spite of all their efforts, as long as corporations attempt to gag the voices of the poor, indigenous people, the peasants, civil society, they cannot claim to offer us an agricultural system that is just, sustainable, or honourable.

### References

- ETC Group (2004) *Down on the Farm: The Impact of Nano-Scale Technologies on Food and Agriculture*, Ottawa: Etc Group.
- Greenpeace Briefing Packet (2005) *All That Glitters is Not Gold: The False Hope of Golden Rice*, Greenpeace.
- FAO (2002) *Reducing Poverty and Hunger: The Critical role of Financing for Food, Agriculture and Development*, Rome: FAO.
- Hickey, Ellen and Anuradha Mittal (eds.) (2003) *Voices From the South: The Third World debunks corporate myths on genetically engineered crops*, Oakland: Food First Books.
- Margulis, Charles (2005) 'Nanotechnology: New promises, new problems, Center for Environmental Health briefing paper.
- Mousseau, Frederic and Anuradha Mittal (2005) *Inequity in International Agricultural Trade: The marginalization of developing countries and their small farmers*, Oakland, The Oakland Institute.
- The Economist* (2002) 'GM Crops in Africa', 19 September.