Seedling

Biodiversity, Rights and Livelihood

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The threat of GM sugar

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GRAIN is an international non-profit organisation which promotes the sustainable management and use of agricultural biodiversity based on people's control over genetic resources and local knowledge. To find out more about GRAIN, visit www.grain.org.

Seedling

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In this issue...

Despite growing evidence that industrial farming is destroying our planet, the giant agricultural corporations are continuing to tighten their grip over world farming. Paradoxically, it is the European Union's half-hearted and misguided move to combat climate change by insisting that motor vehicles use more agrofuels that is encouraging one of the most dramatic manifestations of this trend – the rapid expansion of sugar cane cultivation in Brazil. The country's ethanol boom, vociferously encouraged by President Lula, is not only pushing the agricultural frontier ever deeper into the Amazon basin but is also – and this has gone largely unnoticed – greatly strengthening the penetration of multinational corporations. As we show in some detail in our first article, the latest arrival is Monsanto, which, by unexpectedly snapping up two local companies at the end of last year, has overnight turned itself into the world's largest sugar cane breeding company. The big attraction for Monsanto is the prospect of introducing genetically modified sugar cane into the world's largest market.

Given the increasing dominance of these companies, it is perhaps scarcely surprising that, while the interlinked food, financial and economic crises are wreaking havoc on the lives of millions of ordinary people throughout the world, the agribusiness giants are just getting richer and richer. A year ago we published an article which revealed that, while people in many parts of the world had been protesting against record food prices, the agribusiness giants had raked in shamelessly high profits. Now, in a brief update, we show that the situation has got even worse. To mention just two of the companies: Cargill's profit rose by a further 69 per cent in 2008 and Monsanto's by an extraordinary 120 per cent.

Another frightening – and also under-reported – phenomenon has been the way dominant powers, particularly the United States, have taken advantage of programmes of agricultural reconstruction after wars and natural disasters. Our analysis makes it clear that "military" aid and "agricultural" aid have become so deeply intermeshed that it has become all but impossible to distinguish one from the other. What we may be seeing is the construction of a new template for US aid abroad.

Corporations are often found to be promoting their own interests in the most unlikely and opportunistic fashion. A case in point concerns the endeavours to develop a vaccine for bird flu. Edward Hammond, an expert on infectious diseases, provides a detailed account of how the world's largest vaccine companies have been using the World Health Organisation to obtain samples of bird flu viruses for free from developing countries, but have then been refusing to make available to those very countries the vaccines that they develop. This story is still unfolding: Indonesia, outraged by what has been happening, is trying to get the WHO to change its rules.

While agribusiness is on the offensive, the voices of opposition have also grown louder. One of the people who has been putting forward a powerful alternative vision for many years is Dr Melaku Worede, the Ethiopian plant geneticist. For many decades he has been saying that the best way to enhance farmers' incomes and to protect the planet's biodiversity is by encouraging diversity on the farm and by making sure farmers control the seed breeding and selection process. Several decades ago Dr Worede developed a breeding programme with farmers that increased the yields of their own land race varieties to such an extent that they became competitive with commercial varieties. In 1989 Dr Worede was awarded the Right Livelihood Award – the alternative Nobel Prize – for his work with Ethiopia's plant genetic diversity and food security.

In his interview with us, Dr Worede admits that the outlook for Africa is scary, largely because of the speed with which the climate is changing. But he sees a way forward through the urgent creation of extensive interlinked seed exchange networks that permit a flow of seeds between farmers in different regions and in different countries. These community seed banks, he says, allow farmers to cross-fertilise in terms of seeds and knowledge and thus to adapt to climate change. "We also need to look to wild varieties, as they are hardier than those that are cultivated", he says. Diversity, he stresses, is the key to the future. And, acting in tandem with this, farmers' knowledge. "Without that, you can forget it", he warns.

The editor

One of the most destructive developments in agriculture over the past two decades has been the boom in soya production in the southern cone of Latin America. The corporations that led that boom are now moving aggressively into sugar cane, focusing on large tracts of land in southern countries where sugar can be produced cheaply. If these developments are not resisted, the impacts are likely to be severe: local food production will be overrun, workers and communities will face displacement and exposure to increased levels of pesticides, and foreign agribusiness will tighten its grip on sugar production. We look at the intersection between the development of genetically modified (GM) sugar cane and transformations in the global sugar industry.

Corporate candyland

The looming GM sugar cane invasion

GRAIN

Within a span of only 10 years, nearly the entire Argentine pampas and huge swathes of forest and farm land in Brazil, Bolivia, Uruguay and Paraguay have been converted into green deserts of soya monoculture.[1] Latin America's soya boom was, and continues to be, a bonanza for agribusiness. It provided the handful of global grain giants who dominate the international oilseed trade and commercial feed market with a cheap and abundant site of production for the expansion and consolidation of their global operations. These same companies, such as Cargill, ADM and Bunge, have also made billions in selling the required chemical fertilisers, while other big foreign companies, such as AGCO and John Deere, have cashed in on sales of tractors. Monsanto and Syngenta have raked in record profits selling their genetically modified seeds and chemical pesticides.

The soya invasion was based on a model of production revolving around the use of seeds genetically modified to withstand huge doses of chemical herbicides. Monsanto provided both the seeds and the herbicides while a new generation of agricultural companies, run mainly by businessmen in the cities, leased or took over large areas of land and handled the farming. Wherever this model has been deployed small farmers have been driven out and local communities have been devastated by the rural exodus and chemical contamination.

As for the big agribusiness TNCs, the experience with soya in the southern cone has shown how to profit from the expansion of industrial agriculture into developing countries. It has opened the door

1 Walter Pengue and Miguel Altieri, "GM soya bean: Latin America's new colonizer", Seedling, January 2006. http://www.grain.org/seedling/?id=421

Box 1: The current status of genetically modified sugar

Experimentation has been under way with GM sugar beets and sugar cane for more than a decade. While sugar cane has a complex genetic make-up that makes genetic modification difficult, work with GM sugar beet is simpler and has advanced much further. In 2008, the first commercial GM sugar beets, a variety genetically modified by Monsanto and the German seed breeder KWS for resistance to glyphosate (i.e. Roundup Ready), were introduced in the US, and later in Canada. Already, all the major sugar beet seed companies in North America are selling Roundup Ready sugar beet varieties, and some industry insiders predict that nearly 100 per cent of the US crop will be Roundup Ready in 2009, unless the campaigns against GM sugar beets can reverse things (see Box 4). In the EU, by far the biggest market for sugar beet seed, GM sugar beets have not been approved for commercial introduction, even though the Roundup Ready beets have been approved for use as food and feed.

As for GM sugar cane, Monsanto expects to have a Roundup Ready/Bt variety on the market by 2015, and there are other big biotech companies with sugar cane in their sights.[1]

1 Two other GM sugar cane programmes of note are: CTC Brazil's work with GM sugar cane varieties with high sucrose content; and a joint venture between the Max Planck Institute in Germany, the Vasantdada Sugar Institute in Maharashtra, India and an association of sugar cane growers in Chacra, Argentina experimenting with varieties modified through chloroplast transformation.

to a new era of conquest. Sugar, a crop with a long history of environmental and cultural destruction and sheer human exploitation, might well be next in line for a soya-style boom, especially with new genetically modified sugar crops already in the fields (*see* Box 1).

Redrawing the global sugar map

Sugars can be derived from a wide variety of crops, but today most of the world's sugar supply comes from sugar cane. It accounts for over 70 per cent of global sugar production and is planted on around 15 million hectares (ha) in more than 100 countries of the tropics and sub-tropics. The second most import source of sugar is sugar beet, which is grown mainly in the northern hemisphere on 10 million ha in at least 50 countries. But the map of the global production of these crops is in flux, with much of their cultivation shifting and expanding on to new lands.

Three developments in particular have altered the geographical production of sugar. The first has been the emergence of Brazil as the world's largest sugar producer and by far the world's largest sugar exporter. Around three-quarters of the expansion of sugar cane production in the past decade has occurred in Brazil, where the sugar cane area has grown by an average of 300,000 ha per year between 2000 and 2007 – a rate equivalent to the expansion of soya cultivation in the country.[2] In 2008, the sugar cane area rose by a remarkable 14 per cent. A sizeable proportion of Brazil's sugar cane production goes into its local ethanol industry, but much still flows on to the world market (see Figure 3). Today, more than half of global raw sugar exports come from Brazil – up from only 7 per cent in the early 1990s.

Despite the rise of such a huge low-cost producer, the old structure of global production remained largely intact until recently because of long-standing protection schemes for domestic production in the EU and the US, and preferential trading agreements between Europe and those of its former colonies still heavily dependent on sugar exports. However, a second development to hit the sugar industry – the EU sugar reform – has blown this old structure apart.

When Australia, Brazil and Thailand challenged the EU's domestic subsidies and protection of its sugar industry at the WTO, the EU decided to use this case as an opportunity unilaterally to undo its long-standing Sugar Protocol with its former colonies and to make significant changes to its domestic regimes. Quotas still remain to protect EU producers, but these have been reduced and weakened, such that production within the EU will increasingly be concentrated in just a few major sugar producing regions, with the EU no longer dumping subsidised sugar on the global market. The EU market has also been opened up to quota-free, duty-free imports from least developed countries (LDCs) and countries that have signed up to the Economic Partnership Agreements. This means that the former colonies will no longer be

Table 1: Approvals for Monsanto and KWS' H7–1 Roundup Ready sugar beet

Status	Country
Cultivation/food	USA, Canada, Japan
Food	Colombia, EU, Australia, Mexico, New Zealand, Philippines, South Korea, Russia, Singapore

2 Günther Fischer, Edmar Teixeira, Eva Tothne Hizsnyik and Harrij van Velthuizen, "Land use dynamics and sugarcane production", in Peter Zuurbier and Jos van de Vooren (eds), *Sugarcane ethanol: Contributions to climate change mitigation and the environment*, Wageningen Academic Publishers, The Netherlands, 2008.

Table 2: Some biotech firms investing in sugar cane

Company	Sugar cane projects
Dow Agrosciences (USA)	December 2008 – signed a two-year research collaboration with Australia's Cooperative Research Centre for Sugar Industry Innovation through Biotechnology.
Syngenta (Switzerland)	Experimenting with Bt sugar cane in Brazil and with the Vasantdada Sugar Institute in India. Established the Syngenta Centre for Sugarcane Biofuel Development on the campus of the Queensland University of Technology in Australia in 2007 and is working with John Deere on a sugar cane planting technology that will "allow sugar cane growers to replant their fields more frequently."
Dupont (USA)	Sugar cane is a feedstock for its joint venture global biobutonal programme with British Petroleum and Associated British Foods (British Sugar). They are looking at different countries for investment in sugar cane production, notably China and India. British Petroleum has recently made major investments in the Brazilian sugar industry and in a joint venture with Verenium for the production of "energy cane", which can be grown on areas not suitable for sugar cane.
Amyris (USA)	Biotechnology company in a joint venture with Crystalsev, one of Brazil's largest sugar/ethanol companies, and Votorantim, a Brazilian forestry and technology conglomerate, for the development of biodiesel from sugar cane.

able to sell at EU-protected prices, making exports to the EU market uneconomical for all but the lowest-cost producers among them.[3]

As the EU's sugar reforms come into full effect in 2009, the EU is expected to switch suddenly from being a net exporter, dumping millions of tonnes of subsidised sugar on the global market, to a net importer. This is already generating a move to relocate sugar production away from countries such as Fiji, Île de la Réunion and much of the Caribbean, where the costs of production and transportation are high, to countries such as Sudan, Ethiopia, and Mozambique, where the costs of production are low and where there is favourable access to the EU, in terms of both trade agreements and transport. Moreover, outside the EU, large sugar refiners, hungry for sources of cheap sugar to replace the EU exports, are now looking around for alternative supply routes.

The third key development changing the map of global sugar production is the monumental rise of agrofuels. Sugar cane is seen as one of the most cost-effective raw materials for the production of ethanol, if not the most cost-effective. The global market for ethanol is growing fast, as a number of major markets for transport fuels have or are about to put in place mandates that require certain percentages of ethanol to be mixed with petroleum. Before the financial crisis of 2008 and the collapse in oil prices, the sugar industry was awash with investment for new ethanol plants. Lately this investment has slowed, with many projects being delayed or shut down. Still, the government mandates are enough to keep a sizeable amount of money flowing into ethanol production, and there are many large-scale ethanol projects, complete with sugar plantations, coming on stream around the world, pushing sugar production into new areas. Investments are also being made in technologies that could open up new markets for sugar-cane-based agrofuels.[4] In short, the growing agrofuels market has greatly boosted demand for sugar, which, in turn, has expanded global sugar production (*see* Figures 1 and 2).

High times for agribusiness

Big agribusiness is driving these changes to global sugar production and pocketing the proceeds. The major European sugar corporations have used the EU sugar reforms, for instance, to consolidate their control over quota production in the EU and to move into overseas production in lower-cost areas with preferential access to the EU.[5]

But the big players from the South in the sugar industry, which have traditionally focused on national production, are starting to expand overseas as well. For example, Thailand's largest sugar company, Mitr Phol, is setting up operations in Laos to produce for export to the EU through a joint venture with Tate & Lyle, while Colombia's Manuelita sugar company has expanded into Peru and Brazil. Sudan and Ethiopia have become particularly important targets for investment from southern investors, something their governments are embracing. The government of Sudan says

Table 3: Top seven global sugar producers

Company	Country	Sugar production (mt/year)
Sudzucker	Germany	4.24
Associated British Foods	UK	3.85
Copersucar	Brazil	3.56
Cosan	Brazil	3.15
Eurosugar	France/ Germany	3
Tereos	France	2.8
Mitr Phol	Thailand	2.7

* Does not include ethanol

3 For an excellent history and analysis of the EU sugar reforms, see Ben Richardson, "Restructuring the EU–ACP sugar regime: Out of the strong there came forth sweetness", Review of International Political Economy, 28 January 2009. http://tinyurl.com/at9oax

4 For a more detailed analysis, see ETC Group, "Commodifying Nature's Last Straw? Extreme Genetic Engineering and the Post-Petroleum Sugar Economy", October 2008. http://tinyurl.com/cayhzo

5 The Everything But Arms initiative, which came into force in March 2001, opens the EU to duty-free, quota-free imports from all LDCs, with a transitional arrangement in place for sugar until July 2009.

that it wants to expand sugar cane production in the country from the less than 200,000 hectares currently under production to 1.7 million hectares.[6]

There are new players getting into the sugar industry too, mainly for ethanol. The giants of the grain trade, who until recently were not much involved in sugar cane or sugar beet production, are now moving aggressively into the industry. Cargill, which already controls 15 per cent of the global sugar trade, has recently made major investments in sugar cane production in Brazil and Mexico, and has launched new joint venture refineries and/or ethanol operations in Syria, India and El Salvador. Even ADM, the king of US corn ethanol, launched its first major investment into Brazilian sugar cane in 2008, with a joint venture that involves two sugar/ethanol plants and large-scale plantations. The same goes for the energy and natural resource companies based in the North and the South – both big established players, such as BP, and smaller venture capitalists from the mining sector.

The basic picture, then, is of a major expansion in global sugar production, concentrated both geographically and in the hands of a smaller number of corporations that operate vertically integrated global chains of production and distribution.

Brazil's sugar boom

The trends in global sugar production bear down most heavily on Brazil. There, the sugar industry is increasingly concentrated in the hands of a few families, known in Brazil as the sugar barons, and a few foreign companies, typically acting in partnership with each other. With foreign investment flooding into Brazilian sugar – US$9 billion in ethanol alone in 2006 – the sugar barons have been consolidating their holdings and restructuring their companies in order to capture these inflows. Some have even put their family businesses on to the Brazilian stock exchange. What often happens is that foreign investors buy up controlling interests or minority stakes, leaving the sugar barons to oversee the agricultural operations – although foreign investors are starting to take a more dominant role in both (see Box 2). Foreign-owned mills processed 12 per cent of Brazil's sugar cane during 2007–8, up from less than 1 per cent at the beginning of the decade. If the mills with foreign minority-ownership are included, this figure jumps to 23 per cent.[7] Today it is possible to discern just a few conglomerates – transnational networks of TNCs and sugar families – that control much of the industry. The main three are built around Cosan, Crystalsev and Copersucar, which, according to Maurílio Biagi Filho, the head of Crystalsev, own nearly a third of Brazil's mills.[8]

Table 4: Major European sugar corporations investing in overseas sugar production and supply

Company	Countries
Associated British Foods (UK)	China, Malawi, Mali, Mozambique, Swaziland, South Africa, Tanzania, Zambia
Tereos (France)	Mozambique, Brazil
Sudzucker (Germany)	Mauritius
JL Vilgrain (France)	Cameroon, Chad, Republic of the Congo
Tate & Lyle (UK)	Egypt, Laos, Zimbabwe
AlcoGroup (Belgium)	Brazil, Mauritius

With Brazil's sugar boom, production has shifted from the north-east of the country to the centre–south, where the terrain is more suitable to mechanised production. Millions of hectares of the *cerrado*, a region of Brazil comparable to the Amazon for the richness of its biodiversity, have been cleared for new sugar cane production.[9] The mills in this region now account for about 90 per cent of Brazil's sugar output, with roughly 60 per cent of this converted into ethanol.[10] The area has become the power base of the industry and, with heavy support from President Lula's government, the region's politically connected sugar barons and their foreign partners have been easily able to push through their agendas for expansion – converting vast areas of agricultural and forests lands to sugar cane production in the process. And while the global financial crisis has slowed things down, the World Bank's International Finance Corporation, the Brazilian development bank (BNDES), and the Inter-American Development Bank have stepped in with funds to keep the expansion and consolidation on track.[11] Several private investment funds with hundreds of millions of dollars have also recently been established to buy land in Brazil for conversion to sugar cane production, including the Radar Propriedades fund managed by Cosan, the Calyx fund managed by Louis Dreyfus and the BrasilAgro fund managed by Cresud, a company owned by Argentine soya baron Eduardo Elsztain. Not surprisingly, land conflicts are on the rise where sugar cane is expanding, as is the violence inflicted on those who dare to resist.[12]

The model of production pursued by the sugar conglomerates in Brazil is large-scale and vertically

6 "Sudan announces ambitious plan for sugar production", *Sudan Tribune*, 7 March 2008. http://tinyurl.com/apfern

7 União dos Produtores de Bioenergia (UDOP), "Capital estrangeiro responde por 12% da cana moída no Brasil", 4 February 2009. http://tinyurl.com/aalnjv

8 "Açúcar e álcool são os paradoxos da crise", *Gazeta Mercantil*, 17 November 2008. http://tinyurl.com/cntqny

9 Maria Luisa Mendonça, "Impacts of Expansion of Sugarcane Monocropping for Ethanol Production", Rede Social de Justiça e Direitos Humanos and Comissão Pastoral da Terra, October 2008, available online from the Transnational Institute (TNI). http://tinyurl.com/dbrvu2

10 Ben Richardson, "An Exclusive Engine of Growth: The Development Model of Brazilian Sugarcane", Ethical-Sugar, 17 January 2009. http://tinyurl.com/aooogg

11 In 2008, BNDES released nearly US$2.5 billion to the sugar/ethanol industry, (Centro de Monitoramento de Agrocombustíveis–Repórter Brasil, "O Brasil dos Agrocombustíveis: Os Impactos das Lavouras sobre a Terra, o Meio e a Sociedade, Volume 3 – Cana-de-açúcar", 2009. http://tinyurl.com/bca4ev) See also Inter-American Development Bank, "IDB backs $150 million Regional Financing Facility for Sugar and Bioenergy", 16 January 2009. http://tinyurl.com/aatudm

12 See for instance, the following report from the state of Mato Grosso do Sul, into which sugar cane production has recently expanded: Miecesław Kudlavicz and Juliana Grasiéli Mota Bueno, "A expansão canavieira em Mato Grosso do Sul," Comissão Pastoral da Terra, 26 August 2008. http://tinyurl.com/cxnq6f

Box 2: Today's sugar companies in Brazil: Guarani and CNAA

Açúcar Guarani

Açúcar Guarani is the Brazilian subsidiary of the French transnational sugar corporation Tereos. The company maintains tight control over its sugar supply. A third of its supply comes from its own plantations, where it has increased the level of mechanised harvesting from 32 per cent in 2004 to 80 per cent in 2008. The rest is contracted to outside suppliers who must use Guarani's sugar cane varieties and who must adhere to Guarani's systems for such things as soil preparation, planting, harvesting and disease management. Guarani is one of a few sugar companies in Brazil to have signed up to a sustainable-ethanol supply contract with Swedish ethanol producer Sekab, which requires complete mechanisation of production.[1]

The Companhia Nacional de Açúcar e Álcool (CNAA)

In 2007, Goldman Sachs bought 19 per cent of Brazil's second largest sugar mill, Santa Elisa, part of the Crystalsev Conglomerate. At around the same time, Santa Elisa and Goldman Sachs launched a US$300m joint venture with the international trading company Global Foods Holding, and US private equity firm the Carlyle Group. The joint venture, called CNAA, was to set up four large sugar mills and ethanol facilities, making it one of Brazil's top three sugar/ethanol producers. Company representatives say that it will focus on expanding into the "newer" cane-growing areas of the centre–south, with Crystalsev handling domestic distribution and Global Foods Holding organising international trade. The CNAA joint venture has benefited from a recent US$270m loan injection from the Inter-American Development Bank and more than US$200m in financing from the Brazilian development bank (BNDES). Two of the mills are already in operation and a third is being built. In early 2009, Carlyle raised its stake in the company to become the majority owner, while Santa Elisa was taken out of the management structure. The company is now run by a completely foreign-controlled fund that brings together the Carlyle Group, Goldman Sachs, Global Foods Holding, and Discovery Capital.

1 Sekab, "Requirements for Sustainable Ethanol". http://tinyurl.com/dd6qvp

integrated. Three-quarters of the sugar cane land in the country is either owned or leased by the mills, and Brazil's 60,000 independent growers, with farms of less than 150 hectares, account for just 27 per cent of national production.[13] Labour conditions on the sugar plantations are notoriously brutal, and as the sugar companies have grown in power they have been able to extract more and more from their workers, who are generally paid by the amount of cane they cut. The average tonnage of cane cut per day in the São Paulo region has doubled from 5–6 tonnes in the 1980s to 10–12 tonnes today – which translates into an estimated 12,000 strikes of a machete per day.[14] Since 2000, sugar cane cutters in this region have increased their productivity by 11.9 per cent, but the amount they are paid for the cane has increased only 9.8 per cent over the same period.[15] Every year some workers die from exhaustion, and forced labour remains widespread in the industry. The Comissão Pastoral da Terra reports that 2,164 workers were freed from forced labour on Brazil's sugar plantations in 2008.[16]

The model of production is also increasingly industrial – relying on the machines, new cultivars, and chemical inputs supplied by agribusiness. The boom in sugar cane is a major reason why Brazil's pesticide market increased fourfold between 1992 and 2006 to be worth over US$5 billion in 2007.[17] It is generating a huge new growth market for the foreign-owned companies that control Brazil's tractor market too.[18] For the sugar companies, mechanisation reduces the need for manual labour, freeing them in part from the demands of workers and the increasing international criticism of working conditions on Brazilian sugar plantations. It is also a way to avoid the common practice of burning fields before manual harvests, which weighs heavily on the argument for the environmental merits of Brazilian ethanol. In fact, the "sustainability" criteria drawn up by EU ethanol importers and their Brazilian suppliers requires mechanisation and, in this direction, the Brazilian government introduced a Protocol in 2007 to eliminate the burning of fields on 20 per cent of sugar cane lands by 2010, and 100 per cent by 2020.

In short, then, the sugar expansion in Brazil is characterised by a high level of corporate control, rapid and massive land conversion and an industrial model of production, based on labour exploitation and the supply of modern machinery and inputs by agribusiness.[19] Brazil may be the epicentre of the global boom in sugar cane production, but a number of other countries are also being sucked in, following the same agribusiness model. Indeed, Brazil has now become the leading proponent of sugar-cane-based ethanol on the international scene, supplying Brazilian finance, investment and technology to countries around the globe to engage in its production.

13 Ben Richardson, "An Exclusive Engine of Growth: The Development Model of Brazilian Sugarcane", Ethical-Sugar, 17 January 2009. http://tinyurl.com/aooogg

14 Silvia Noronha, Lúcia Ortiz and Sergio Schlesinger, "Agribusiness and Biofuels: An Explosive Mixture," Friends of the Earth, Brazil, 2006.

15 Centro de Monitoramento de Agrocombustíveis - Repórter Brasil, "O Brasil dos Agrocombustíveis: Os Impactos das Lavouras sobre a Terra, o Meio e a Sociedade, Volume 3 – Cana-de-açúcar", 2009. http://tinyurl.com/bca4ev

16 CPT, "Em ano recorde em operações, mais de 4,6 mil trabalhadores são libertados", 19 January 2009. http://tinyurl.com/dalpyc

17 Friedrich Berschauer, "The long-term growth trends for the Brazilian agro business remain firmly intact", Bayer CropScience, 20 April 2007. http://tinyurl.com/bd77dv

18 Company reports from 2005 show that the Brazilian tractor market is controlled by AGCO/Valtra (65%), New Holland (18%) and John Deere (7.5%).

Table 5: Syngenta's tropical sugar beet projects

Partner	Country	Details
Maquiltec S.A., Campos Chilenos (EDF&Man)	Colombia	US$250 million ethanol project put on hold in January 2009 for financial reasons. Expected to require 8,000 ha of sugar beet production.[1]
MIDROC	Ethiopia	US$300 million project in Amhara state involving 30,000 ha plantation and contract-grower scheme.
Vasantdada Sugar Institute (VSI), Harneshwar Agro Products	India	With the Samarth Cooperative Sugar Mill, VSI grew sugar beet for food use on some 48.5 ha of land and processed at a pilot plant at Ambad, near Jalna, Maharashtra. With Harneshwar Agro Products, it contracted sugar beet production with the company's 12,000 farmer shareholders and built a bio-ethanol production plant to process the beets, also in Maharashtra.
Unknown	Sudan	Sugar beet is grown on around 70,000 ha in Sudan and is being expanded through the establishment of a sugar beet factory in the Gezira Scheme by investors from the United Arab Emirates. Syngenta has conducted field trials of its sugar beet in the country.

1 "Campos Chilenos paraliza proyecto de etanol en Colombia por US$270 millones por falta de financiamiento," 29 January 2009. http://tinyurl.com/bbfvdy

Monsanto makes its move into Brazilian sugar and beyond

A key part of the story of the expansion of Brazilian sugar production was the development of varieties suited to the centre–south region and to ethanol production. Most of these varieties were developed by the Centro de Tecnologia Canavieira (CTC), a semi-private institution that was controlled by Copersucar but is now owned by a collection of the country's top sugar mills. CTC used to charge non-members royalties, but now denies any access to its varieties to those outside its structure, who account for over half the country's sugar production.[20]

A new player, however, recently emerged on the scene, which is eating into CTC's dominant position. CanaVialis, the world's largest private-sector sugar cane breeding company, was set up in 2003 by several former public breeders with financing from the Brazilian conglomerate Votorantim, along with a sister company, Allelyx, devoted to sugar cane biotechnology. Similar to the CTC, CanaVialis works for the major sugar companies, who contract it to develop varieties specifically for them. CanaVialis recently signed a US$25 million deal with Cosan to set up 10 research stations and develop sugar cane varieties. It has also developed sugar cane varieties for Odebrecht's sugar cane plantation in Angola. CanaVialis says that its varieties now cover at least 15 per cent of Brazil's sugar cane area. In Brazil, then, sugar cane breeding has become a potentially profitable business, something which has yet to happen elsewhere.

The development was not lost on the world's largest seed company, Monsanto. In 2007, it began a partnership with CanaVialis and Allelyx to develop varieties of sugar cane genetically modified for resistance to glyphosate (Roundup Ready). Then, at the end of 2008, it decided to buy out both companies for US$280 million, suddenly catapulting Monsanto into the position of the world's largest sugar cane breeding company.

Monsanto is clear that its intention is to use CanaVialis' network of corporate clients and its germplasm collection as the basis for a widespread introduction of GM sugar cane. Sugar cane, unlike soya, is perennial, and farmers typically replant only every five years or so – and then they use cuttings, not seeds. So Monsanto plans to sell its varieties according to the CanaVialis model – working through contracts and partnerships with the major mills, who will use the varieties on their own plantations and through contract production with their suppliers. The same model could then easily be applied outside of Brazil. CanaVialis has already been doing varietal development in Angola and California, and Brazil's centre–south sugar cane varieties are cultivated elsewhere in the world, including in Sudan by Kenana Sugar, the world's largest integrated sugar company.

Part of Monsanto's road to GM sugar cane is already being paved by Roundup Ready sugar beets. These were introduced in the US and Canada in 2008 and Monsanto has regulatory approval to export them to major markets such as the EU and Japan. Similar regulatory approvals could be given for Roundup Ready sugar cane since, in both cases, the refined product is said to be free of transgenic material. This, at least, is what the proponents of GM sugar argue. In Australia, where both Dow and Syngenta are collaborating with leading public research institutes on GM sugar cane, the sugar industry has already formed a lobby group to facilitate the introduction of GM sugar cane – the Sugarcane Gene Technology Group, which is modelled on the GM sugar beet lobby group in the US.[21]

19 For a more comprehensive report on Brazilian sugarcane production, see Maria Luisa Mendonça, "Impacts of Expansion of Sugarcane Monocropping for Ethanol Production", Rede Social de Justiça e Direitos Humanos e Comissão Pastoral da Terra, October 2008, available online from the Transnational Institute (TNI). http://tinyurl.com/dbrvu2

20 Janaína Simões, "Center of Sugarcane Technology indicates the path and sets the pace for technological innovation in the sugar and alcohol sector," State University of Campinas, UNICAMP Innovation, 5 June 2006. http://tinyurl.com/bpg8xm

21 See Queensland Cane Growers Organisation Ltd, 2008 Annual Report. http://tinyurl.com/bw9z57 and A. Wynne, B. Milford and E. Wall, "Advancing sugarcane: leading and managing change," Second ISSCT management workshop, Australia, May 2008. http://tinyurl.com/dj3v79

Box 3: GM sugar beets heading south?

Sugar beets are crops not just of the EU and North America. They are grown extensively in China, Russia, Eastern Europe, Egypt, Sudan, Turkey and Argentina. Moreover, Syngenta is developing a tropical sugar beet to be used mainly for ethanol. The beet can be grown where there is insufficient water for sugar cane – opening up new areas for sugar production. Syngenta projects a near-term expansion of tropical sugar beet production of 1–3 million hectares globally, and has been conducting field trials in a number of countries, including China, Australia, Thailand, Vietnam, Kenya, South Africa, Ethiopia, Sudan, Brazil, Colombia, Peru, Mexico and the US.[1] At this point, Syngenta's tropical beets are not called GMOs, but the company is heavily involved in work on GM sugar beet, and its subsidiary Hilleshog is a leading supplier of Roundup Ready sugar beets.

1 Syngenta press release, "Syngenta's tropical sugar beet receives World Business and Development Award", 25 September 2008. http://tinyurl.com/awxnqn

Deserts of GM sugar cane

As with all other GM crops introduced on the market so far, the looming first round of GM sugar cane will be modified for resistance to Monsanto's glyphosate herbicide, Roundup. Just as with GM soya, the appeal of these GM sugar cane crops is that they simplify things for large-scale, industrial production. GM soya took off in Latin America because it made farming easy for agribusiness investors, concerned only with raking quick profits off large areas of fertile land. It will be exactly the same for GM sugar cane. The Roundup Ready trait makes controlling weeds a simple affair of dousing the fields every once in a while with glyphosate.

It is a system tailor-made for big sugar multinationals, which are expanding their vertical control over global sugar production and distribution. It is perfectly adapted to their strategies for increased mechanised production, in Brazil and elsewhere, and will facilitate the conversion of more agricultural land to corporate sugar cane production that will be used mainly for ethanol. Independent, small-scale producers will be completely excluded from this system, and vast areas of land that are or could be occupied by small farmers and used for local food production will be transformed into green deserts of GM sugar cane.[22] To put this in perspective, the Brazilian government claims to have identified an additional 44 million hectares for sugar cane production – around six times the current sugar cane area (which already accounts for one third of global production).[23]

The environmental and health impacts of a GM sugar cane boom will also be severe. While Roundup Ready sugarcane might simplify herbicide applications, the experience of Roundup Ready soya in Latin America shows how it fosters an abusive use of pesticides.[24] Because the crops are genetically modified to tolerate high levels of glyphosate, fields are drenched with the stuff, often sprayed by planes, with complete disregard for

Table 6: Examples of land/water conflicts over sugar cane expansion

Country	Conflict
Mali	Illovo (ABF) is constructing an ethanol plant and sugar cane mill on 14,000 ha of land in the Office du Niger. The project is opposed by the national coordination of farmers' organisations (CNOP).
Ethiopia	Expansion of sugar cane production into the Awash Basin of Ethiopia has generated land conflict with the Afar pastoralists, whose ways of life are directly threatened by the new sugar cane projects.
Mozambique	Farmers are protesting against an ethanol project spearheaded by mining company Camec, because it will deprive them of water.
Sudan	Protesters from the village of El Wag in White Nile state blocked a highway in July 2008 demanding compensation for the construction of the new White Nile Sugar project. A clash with police left 3 villagers dead and 8 wounded.
Brazil	In 2007, the Landless Workers Movement (MST) invaded Cargill's Cevasa ethanol mill in São Paulo and, a month later, 6,000 hectares of land, also in São Paulo, where they torched 30 tonnes of unplanted sugar cane.

Sources: The Afar Human Rights Organisation, "Ethiopian Govt endangers Afar pastoralists ecosystem," 4 July 2007. http://tinyurl.com/dxa3ny
Juba Post, 25 October 2008. http://tinyurl.com/cgoxn7
Ethical-Sugar, "An Exclusive Engine of Growth: The Development Model of Brazilian Sugarcane," January 2009. http://tinyurl.com/aooogg

22 UITA, "Brasil: la Caña de Azúcar avanza también sobre la pradera", 14 May 2008. http://tinyurl.com/arjv5m

23 Safras & Mercado, "Zoneamento pode expandir área de cana-de-açúcar em 44 milhões de hectares," Notícias Agrícolas, 23 January 2009. http://tinyurl.com/c3jtvk

24 Lilian Joensen, "The crop-sprayed villages of Argentina," in Javiera Rulli (ed.), *United Soy Republics. The truth about soy production in South America*, Grupo de Reflexión Rural, 2008. http://tinyurl.com/d42upx

Box 4: Campaigns against GM sugar in North America

In January 2008, Earthjustice and the Center for Food Safety filed a federal lawsuit on behalf of the Organic Seed Alliance, Sierra Club, and High Mowing Organic Seeds, challenging the US Department of Agriculture's (USDA) decision to deregulate Roundup Ready sugar beets. The lawsuit seeks to reverse the approval of genetically engineered sugar beets and to force the USDA to conduct an Environmental Impact Assessment, as required by law.

The groups say they are opposed to Roundup Ready sugar beets because: they will increase the use of of toxic herbicides; they will contaminate conventional and organic seeds (including relatives of sugar beets, like Swiss chard and table beets); they will jeopardise markets for other farmers; and they have not been proven safe for consumption. Apart from the legal action, these groups have been involved with a wider coalition of groups seeking to put pressure on food companies not to accept GM sugar for their products. They have launched a petition and letter-writing campaign, and have established a registry of companies that pledge not to use GM sugar.[1]

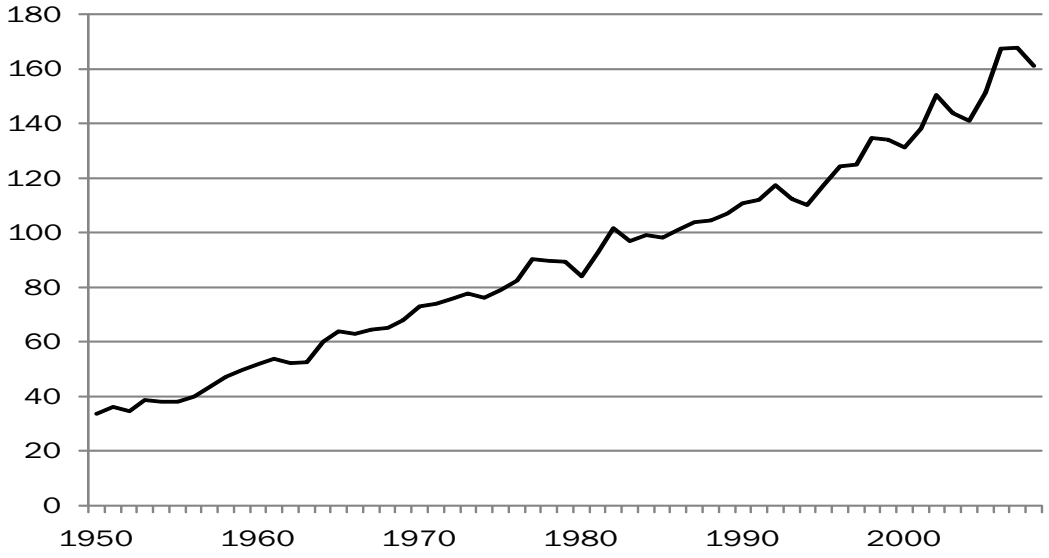
Groups are mobilising to oppose GM sugar beets in Canada as well. On Valentine's day, the Canadian Biotechnology Action Network led an action in which 1500 letters were sent by email and post to the president of Lantic, Canada's only remaining sugar company, urging it to stay GM-Free. Also, in 2008, local groups successfully thwarted the establishment of a sugar beet ethanol plant on Prince Edward Island that would have grown Monsanto's Roundup Ready sugar beets as feedstock.[2]

1 Center for Food Safety, "Tainted Sugar", Food Safety Fact Sheet, June 2008. http://tinyurl.com/526b8c
Non-GM sugar beet registry available at http://tinyurl.com/dy7xkb
2 See the CBAN website. http://tinyurl.com/cfg3ly

the impact on surrounding communities. During the approval process for its Roundup Ready sugar beet in the US, Monsanto successfully lobbied the US Environmental Protection Agency to increase by 5,000 per cent the glyphosate residues allowed on sugar beet roots.[25] Roundup (glyphosate) is a toxic herbicide that presents serious risks to human health, even at low levels.[26]

Moreover, Roundup Ready is likely to encourage the use of multiple herbicides. With sugar cane, the common practice of no-till farming under mechanised production often relies on glyphosate to destroy the remaining ratoon (stubble) when it is time for replanting. Since this practice will not be possible when the ratoon has tolerance to glyphosate, no-till with Roundup Ready sugar cane is likely to require additional herbicides. The growing presence of glyphosate-tolerant weeds and Roundup Ready volunteers (maize and soya), especially in Latin America, will also force industrial operations growing Roundup Ready sugar cane to use additional herbicides. To deal with such problems with its soya, Monsanto says

Figure 1. World Sugar Production, 1950–2008
(million tonnes)



Source: F.O. Licht's *International Sugar and Sweetener Report*, various years

25 Center for Food Safety, "Tainted Sugar", Food Safety Fact Sheet, June 2008. http://tinyurl.com/526b8c

26 N. Benachour and G-E. Séralini, "Glyphosate formulations Induce Apoptosis and Necrosis in Human Umbilical, Embryonic, and Placental Cells", *Chem. Res. Toxicol.*, 22 (1), 2009, pp. 97–105; Dr Mae-Wan Ho and Brett Cherry, "Death by Multiple Poisoning, Glyphosate and Roundup," ISIS Press Release, 11 February 2009. http://tinyurl.com/b9phjy

Photo courtesy of Jorge Chullén

Cane cutters handling glyphosate with inadequate socks instead of protective gloves.

it will soon be introducing a Roundup Ready soya that is also resistant to the herbicide dicamba – so that both herbicides can be sprayed to ensure that any glyphosate-tolerant weeds are destroyed.[27]

Farm workers are often the worst affected by such pesticide practices. Jorge Chullén of the International Union of Food Workers says that the problem of pesticides for workers in sugar cane plantations has intensified in recent years, particularly because there is an increasing tendency for the mills to outsource the application of pesticides, among other field operations, to contractors, thus evading their responsibilities to their workers. He describes the working conditions with these outsourcing operations as "horrible" and says that the practice is further deteriorating safety standards for workers. GM sugarcane could thus be a double blow to workers – increasing their exposure to pesticides and contributing to a process of mechanisation that wipes out jobs in the sector.[28]

The other side of sugar

Sugar cane production has become so industrialised and so integrated into the corporate food system that other forms of production and use are often not recognised. But local communities sustain entirely different – and important – cultures based on sugar cane. When not refined and chemically treated, sugar cane is actually a highly nutritious crop, rich in vitamins and minerals. It provides an important food source that flows into a vast small-scale food economy – from the jaggery (*gur*) makers in India to the street vendors selling cane juice in almost any tropical country in the world.

In Colombia, communities have a long-standing tradition of organising what they call "trapiches comunitarios", where they process the juice from their local sugar cane into a concentrated product called *panela*. As in other parts of Latin America, local farmers in Colombia maintain their own sugar cane varieties, adapted to their lands and to the making of *panela*. Several of these traditional varieties have been documented by the Instituto Mayor Campesino (IMCA). Erminsu Iván David Pabón-Mincho, a programme coordinator with IMCA, says that the *trapiches comunitarios* and the local sugar cane varieties that they utilise are critical to the livelihoods and well-being of rural communities in Colombia. But he says that the recent drive to expand sugar production in the country, especially for ethanol, threatens to take away the already limited lands that these communities have for the production of their own sugar cane. Moreover, he sees government regulations of the sugar industry as designed to penalise local *panela* production and to concentrate the sugar industry in the hands of big companies.

Communities such as these are directly in the path of GM sugar cane. They are the ones most at risk of losing their land from GM sugar cane expansion, of losing their jobs from the mechanisation of sugar production, of having their communities polluted by herbicides, and of having their traditional sugar cane crops contaminated by GMOs. Moreover, they are most at risk of any adverse health consequences from GM sugar, since they consume sugar cane in its pure form and depend on it as a source of nutrition, not just as a sweetener. So far, in the approval of GM sugar beets, authorities have considered the impact on diet of only the refined form, where the transgenic material is supposedly no longer present.[29]

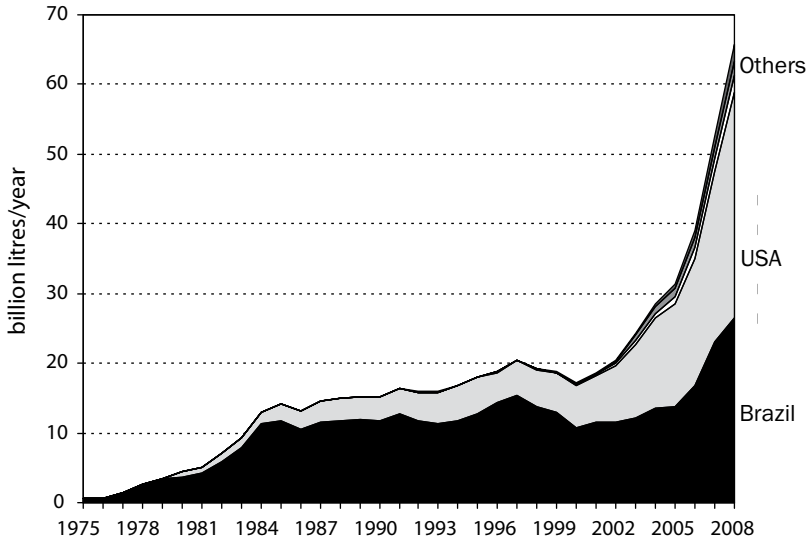
Taking a stand against GM sugar cane, and GM sugar in general, is thus important for many reasons. It is part of a larger opposition to the expansion of corporate sugar over agricultural land that should instead be used by farmers for local food production. It is also a rejection of the industrialisation and dehumanisation of a food crop that has significant cultural and economic meaning for many communities, especially with the current rise of sugar-cane-based ethanol. Workers, farmers and other food producers throughout the tropics and sub-tropics depend on sugar cane as a food source and for their livelihoods. Today they are suffering badly as agribusiness and governments collude to redesign the world map of sugar production. The introduction of GM sugar cane will only worsen and intensify their problems.

27 See GRAIN, "Twelve years of GM soya in Argentina", Seedling, January 2009. grain.org/seedling/?id=578

28 The Brazilian sugar industry estimates that mechanisation will lead to the net loss of 114,000 jobs between 2010 and 2021 in São Paulo state (Ethical-Sugar , "An Exclusive Engine of Growth: The Development Model of Brazilian Sugarcane," January 2009 http://tinyurl.com/aooogg) Mechanisation does not necessarily provide workers with safer working conditions. A study in Brazil concluded that the pattern of illness among harvester operators is similar to that of manual sugar cane cutters (R.A. Scopinho, F. Eid, C.E. Vian, P.R. Silva, "New technologies and workers' health: mechanization of sugar cane harvesting," *Caderno Saúde Pública*, 15 (1), January–March 1999, pp. 147–61).

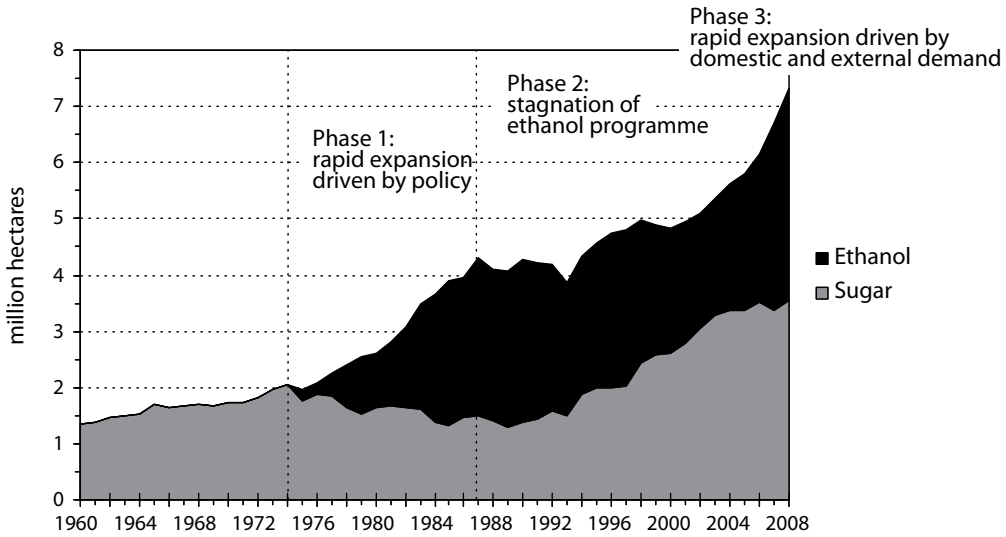
29 See, for example, Health Canada's approval of H7-1 Roundup Ready sugar beets. http://tinyurl.com/aszd94

Figure 2: World production of fuel ethanol (bn litres/year)



Source: F.O. Licht's *International Sugar and Sweetener Report*, 2007 and 2008

Figure 3: Land in Brazil under sugar cane cultivation



Source: Peter Zuurbier and Jos van de Vooren (eds), *Sugarcane ethanol: Contributions to climate change mitigation and the environment*, Wageningen Academic Publishers, The Netherlands, 2008

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Javiera Rulli (ed.), *United Soy Republics: The truth about soy production in South America*, Grupo de Reflexión Rural, 2008.
http://tinyurl.com/d42upx

Centro de Monitoramento de Agrocombustíveis – Repórter Brasil, "O Brasil dos Agrocombustíveis: Os Impactos das Lavouras sobre a Terra, o Meio e a Sociedade, Volume 3 – Cana-de-açúcar," 2009.
http://tinyurl.com/bca4ev

Maria Luisa Mendonça, "Impacts of Expansion of Sugarcane Monocropping for Ethanol Production", Rede Social de Justiça e Direitos Humanos and Comissão Pastoral da Terra, October 2008.
http://tinyurl.com/dbrvu2

Lilian Joensen, Stella Semino and Helena Paul, "Argentina: A Case Study on the Impact of Genetically Engineered Soya", Gaia Foundation, 2005.
http://tinyurl.com/dz927p

GRAIN, *Seedling* special issue on agrofuels, July 2007.
http://www.grain.org/seedling/?type=68

In recent decades humanitarian aid has regularly been made conditional on the adoption of neoliberal economic policies. Recently, however, there has been a troubling tendency in war-ridden countries to interweave this aid, classified as "reconstruction", closely with the military machinery of the invading powers. Afghanistan and Iraq have been the testing grounds for this militarised aid. In both countries the distinction between the US's civilian and military activities has been completely, and deliberately, blurred.

The soils of war

The real agenda of agricultural reconstruction*

GRAIN

Asia has seen its fair share of disasters in recent years, both man-made and natural – floods, cyclones, tsunamis, earthquakes, war. After each calamity, outside agencies have provided "aid" to put the pieces back together. For many years this aid has come with the unpublicised agenda of promoting neoliberal economic policies and facilitating the entry of multinational corporations. This remains true today. What is new in Afghanistan and Iraq is that US development assistance has also become an intrinsic part of the US military campaign. This is an alarming development. Aghanistan and Iraq are not unique cases born from unusual circumstances, but constitute a likely template for US activities overseas, as it continues to expand its "war on terror" and to pursue US corporate interests.

Afghanistan: food and bombs

When the US began bombing Afghanistan in 2001, one of its first targets was the Soviet-built Shindand airfield in the west of the country, near the border with Iran. A year later, the US took control of the airfield, one of the country's largest, amid accusations that it intended to use the site as a possible base for operations against Iran. Today the area around Shindand remains a scene of intense warfare between US/NATO and Taliban forces, with civilians caught in the middle.

On 21 August 2008, US planes taking off from the Shindand airfield bombarded a village in Shindand district, killing at least 88 civilians. When protesters later took to the streets of the regional city of Azizabad, the Afghan National Army opened fire on the crowd, leaving several people wounded. The protest had erupted after officials from the central government came with food aid for the affected families. "They destroyed our houses, killed dozens of people and they still send us wheat?" said Hamidullah, a local resident who took part in the protests.[1]

In the war in Afghanistan, bombs and food are a package deal. At the very airfield from which the US planes launched their deadly attack, US forces had established an agricultural training centre just months before. "The agricultural centre … allows us to build a rapport with the villagers through education and employment," says a leader with the

* **For a fuller version** of this article, see GRAIN *Briefing*, "The soils of war – The real agenda behind agricultural reconstruction in Afghanistan and Iraq", March 2009. http://www.grain.org/briefings/?id=217

1 Najib Khelwatgar and Ahmad Qurishi, "Afghan Army open fire on Shindand pro-testers, Karzai worried", PAN, 23 August 2008: http://tinyurl.com/42z5mr

US Special Forces civil affairs team. "They are given a reason to think twice about allowing the anti-Afghan forces to step in and influence their lives in a negative way. The presence of this agricultural centre is a security measure in and of itself."[2] The US officials say that the centre will eventually build up agricultural production for export in the area and wean local farmers away from producing poppies – a crop that still provides more security and income to farmers than the millions of dollars in foreign aid, so little of which trickles down to them. The centre is equipped with laboratories, classrooms, several fish ponds with hatcheries, vineyards and orchards. A weather station and drip irrigation system are planned. All of it is run by the US military.

Afghan workers preparing fields of the US Agriculture Centre in Shindand

To the south-east, USAID contracted the US firm Chemonics Inc. to build an agriculture centre outside Lashkar Gah, a city in the province of Helmand, another area of intense conflict with the Taliban. Chemonics is an international firm that specialises in private sector development and agriculture. It was founded in Washington in 1975, and since then USAID has been its major client.[3] According to its president, Richard Dreiman: "We at Chemonics are proud to be part of Afghanistan's agricultural and agribusiness renaissance."[4] Chemonics says that the location originally chosen for the agriculture centre, in a farming area, was rejected; they were instead "instructed" for "strategic military and security considerations" to establish it at the Lashkar Gah airfield, which is under the control of the UK military.[5] It is clear that the line between the military and aid objectives has been blurred – and purposely so.

Thirty years ago, when Afghanistan was a net exporter of food, Helmand was the country's breadbasket. The US proclaimed after the invasion that by 2007 it would once again make the country self-sufficient in food. Today that goal is as distant as ever, with Afghans still dependent on food imports and foreign assistance. This is largely because the war has continued, devastating the country's agriculture. Rather than genuinely helping Afghans to recover their old farming skills, the agriculture centres provide a veneer of agricultural reconstruction to a military mission that is destroying Afghanistan's food systems. They are an attempt to legitimise the military bases of an occupying power.

The Provincial Reconstruction Teams (PRTs) that the UK and US deploy in the Afghan countryside with increasing frequency serve a similar purpose to the agriculture centres. Some of the PRTs are called Agricultural Development Teams, and they have a specific agricultural mission. Apart from the questionable intent to teach Afghan farmers about how they do things in Iowa or Texas, these teams, composed mainly of soldiers from the National Guard, also make critical contributions to military operations. "It helps in the military kinetic part because it involves cooperation of the local population, and intelligence resources can be brought to bear", explains Army Major-General King E. Sidwell. "It makes friends when you might not otherwise be able to make friends."[6]

Agribusiness grows on the battlefield

The support between the military and agricultural work runs both ways. While agricultural reconstruction facilitates US/NATO military operations, the military operations push forward the agenda of US and other foreign-based agribusiness corporations by creating a context where they can easily put pressure on the government to adopt neoliberal policies. The war provides these corporations with both a lucrative short-term market in the blossoming "reconstruction" industry and an opportunity to integrate Afghanistan into their global production networks and markets in the long term.

Seeds are at the centre of these processes. In 2002, 34 organisations were brought together, under the banner of the Consultative Group on International Agricultural Research (CGIAR) and with US and Australian funding, to form the Future Harvest Consortium to Rebuild Agriculture in Afghanistan (FHCRAA). The Consortium completely bypassed the rich heritage of farmers' varieties, which would have provided the basis for genuine agricultural reconstruction. Instead, it distributed seed from Pakistan and set up seed multiplication programmes

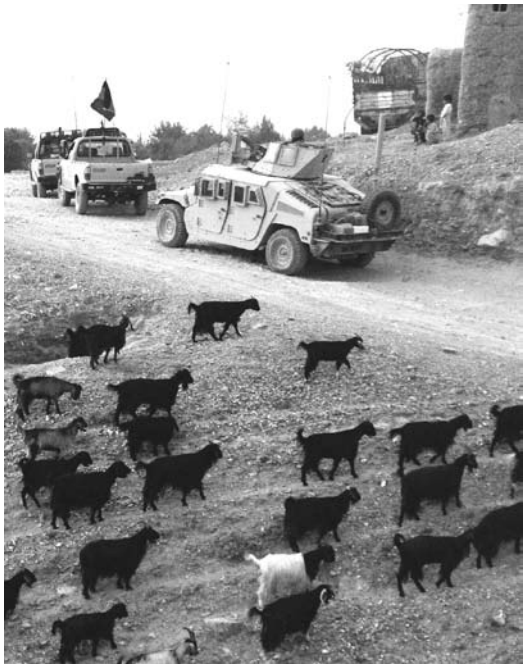
2 A US Special Forces civil affairs team leader, quoted in Anna Perry, "Afghan Agricultural Center Contributes to Better Security", American Forces Press Service, 3 July 2008. http://tinyurl.com/br3zlc

3 See "Chemonics International", Washington Post, Post 200 – Top DC area businesses, http://tinyurl.com/dds7eh

4 "Chemonics announces scholarship at Afghan AgFair", Chemonics' website, 20 February 2009, http://tinyurl.com/ddvsqd

5 Chemonics International Inc., "Lashkar Gah Bost Airport and Agriculture Center, Helmand Province, Afghanistan: Environmental assessment", October 2008. http://tinyurl.com/ajn82e

6 Quoted in Army Staff Sgt Jon Soucy, "Missouri Guard's Agricultural Mission Grows in Afghanistan", American Forces Press Service, 23 December 2008. http://tinyurl.com/couxfb



Goats and occupying army cross paths in Afghanistan

for varieties of other crops brought in from the International Centre for Agricultural Research in the Dry Areas (ICARDA) in Syria.[7] According to an ICARDA survey conducted in 2002, Afghan wheat farmers are "on their own when it comes to replicating and reselecting local variety seed".[8]

The US and EU have been keen to create a seed industry in Afghanistan. Essentially this means building up a few local seed companies that can initially serve as a conduit for seed aid, and later, if the US wins the war, open the door to foreign seed companies and agribusiness. As in the rest of the world, a private seed industry in Afghanistan requires a legislative framework that creates a commercial seed market. This is done through laws that make proprietary seed sale the norm, forcing farmers to buy rather than save or share such seeds, with little protection for farmers' own local varieties and seed practices.[9]

With this legal framework in place, an Afghanistan National Seed Association (ANSA) was created in Kabul with FAO support in October 2008.[10] ANSA is not the only game in town. The Taliban runs its own seed supply networks, with a similar strategy of winning the loyalty of local farmers. Either way – Taliban seed or US Army seed – the seed is certainly not "free". Both come with heavy political agendas – backed by armed forces – that have little to do with the interests of Afghanistan's small farmers. Getting their own seeds back into the hands of these farmers is the only real way that they will find their freedom.

Rebuilding Iraq

Iraq is widely known as the "cradle of civilisation", with its farming systems dating back thousands of years. But what is important today to most US government officials is that Iraq is the number one destination for its hard red winter wheat exports and a top destination for its rice.[11] It is a US$1.5bn market that wasn't accessible to US companies before the invasion, because of the sanctions.[12] Indeed, controlling the development of Iraq's agriculture and food systems was so important to the US that in the early years of its occupation it brought in Dan Amstutz, an ex-Cargill executive and a veteran insider with US trade delegations, to be in charge of this sector.[13]

The US came into Iraq with a heavy agenda for reforming all sectors of its economy, including agriculture. There it implemented a blueprint similar to the one in Afghanistan, albeit on a larger scale and with more flagrant profiteering by US companies. In one of its orders, the CPA abolished agricultural subsidies and opened up the agricultural market. Not surprisingly, the country was flooded with cheap imports, and local food production collapsed. Just as in Afghanistan, changes in seed laws were seen as crucial. However, whereas in Afghanistan it was at least the central government that enacted the new laws, in Iraq farmers' rights to save seeds were struck down by the infamous Order 81 during the last days of the US's Coalition Provisional Authority's rule.[14]

Dan Amstutz was put in charge of the USAID's Agriculture Reconstruction and Development Program for Iraq (ARDI). At the top of ARDI's list was wheat, Iraq's most important food crop. Amstutz facilitated the import, multiplication and distribution of certified wheat seed[15] and set about liberalising and privatising Iraq's wheat sector, and its Public Distribution System in particular.[16] While the chaos following the US invasion made an immediate sell-off or dismantling of Iraq's wheat sector impossible (and illegal under the Geneva Convention), ARDI tried to push the Iraqis down the alternative path of neoliberal reforms that could arrive at the same ends while sidestepping political sensitivities and immediate practical problems.[17] Whatever the eventual outcome, the combined devastation of Iraq's wheat production and the opening of its wheat markets to US imports, both brought about by the US invasion, has yielded billions of dollars for US grain companies.

When ARDI came to a close in 2006, USAID launched two new programmes – a US$343 million Inma Agribusiness Program[18] and Iraq Private

7 See ICARDA's web page about the FHCRAA. http://tinyurl.com/c8793l

8 J. Dennis, A. Diab and P. Trutmann, "The Planning of Emergency Seed Supply for Afghanistan in 2002 and Beyond", a draft concept paper prepared for the Tashkent Conference, 2002. http:// www.afghanseed.org

9 GRAIN, "Seed laws: imposing agricultural apartheid", *Seedling*, June 2005. grain.org/seedling/?id=337

10 SeedQuest, news section, "Message from the President of the newly formed ANSA", 24 October 2008 http://tinyurl.com/b9to3g

11 See Suleiman Al-Khalidi, "Iraq buys 200,000 t of Russian wheat from Glencore", arabian Business.com, 25 September 2008. http://tinyurl.com/bngmlv

12 Policy Archive, "Iraq Agriculture and Food Supply: Background and Issues", June 2004. http://tinyurl.com/br6dmd

13 Cargill, the biggest global trader of agricultural commodities, is a multinational corporation registered in the US. http://www.cargill.com/

14 Focus on the Global South and GRAIN, "Iraq's new patent law: a declaration of war against farmers", Against the grain, October 2004 www.grain.org/articles/?id=6

15 It should be noted that since the invasion the US has sought to dismantle former public programmes which provided subsidised inputs, including seeds, to Iraqi farmers, and that the provision of seeds by US forces is seen as a temporary measure before a "free-market" seed system takes over.

Sector Growth and Employment Generation (Izdihar).[19] Both programmes are being carried out by the Louis Berger Group Inc., one of the world's largest infrastructure and development consultancies, and they are designed to prepare the way for agribusiness investment in the food industry.

Yet, like similar programmes in Afghanistan, these agriculture reconstruction programmes also serve a military function and are immersed in military operations. The US has so far earmarked US$250 million of "reconstruction" funds for 581 agricultural projects, more than 97 per cent of which have been paid for with funds from the Commanders' Emergency Response Program (CERP). Funding for agriculture reconstruction in Afghanistan is also dominated by a similar CERP, meaning that, in both cases, it is the military that ultimately decides which projects are carried out.

The USAID and other so-called civilian programmes in Iraq work with Provincial Reconstruction Teams (PRTs) – modelled on the PRTs that were first set up in Afghanistan. It now seems likely that, under President Obama, the PRTs' importance to the US mission will greatly expand. According to a report in the New York Times on 3 December 2008, "Pentagon planners" are proposing "relabeling some units, so that those currently counted as combat troops could be 're-missioned', their efforts redefined as training and support for the Iraqis".[20] As a result of this ploy, the Pentagon intends to keeps as many as 70,000 troops in Iraq beyond 2011, which is the date established in the US–Iraqi Status of Forces Agreement (SOFA) for the complete withdrawal of all combat troops. This will mean that the distinction between the military and aid workers will be erased. Moreover, by agreeing to this subversion of SOFA, US President Obama has, in practice, given up on his electoral pledge to withdraw US combat troops from Iraq within 16 months.[21]

US Army photo: Sgt. David Turner

Basic inputs for Iraqi farmers – seeds, poultry and so on – are brought from outside and distributed through US military regiments

Conclusion

It would be dangerous to see what is going on in Afghanistan and Iraq as an aberration. The same merging of "hard" and "soft" power is happening with US overseas programmes in other parts of the world. Today the United States spends approximately 30 times more on military operations globally than it does on diplomacy and development under the State Department and USAID. Moreover, the Pentagon now controls more than 20 per cent of US Official Development Assistance.[22] According to Betty McCollum in the US House of Representatives, the fact that USAID has to have an office of military affairs to communicate with the Pentagon "means that something has gone horribly awry".[23]

It is essential for people around the world to prevent aid being hijacked in this way. Aid policies and practices need to be rethought. Some people are calling for an International Agreement on Aid to make aid real and accountable.[24] This has to go hand in hand with demanding demilitarisation and an end to the war in Afghanistan and the occupation of Iraq. No matter how good aid work is, it will not contribute towards genuine reconstruction if it is also being used to reinforce the military interests of the principal donor country and to maintain its hegemonic dominance.

GOING FURTHER

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http://tinyurl.com/c2834p

16 Robert Looney, "Neoliberalism in a Conflict State: The Viability of Economic Shock Therapy in Iraq", *Strategic Insights*, Vol. III, No. 6, June 2004.
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17 See Rich Magnani and Sawsan Al-Sharifi, "Reform and Rehabilitation of Iraq's agricultural sector: The case of the Iraqi wheat sector", USAID–Iraq, 2005.
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Dr Melaku Worede is an Ethiopian plant geneticist who has been a pioneer in shifting perceptions and attitudes globally towards recognising the vital importance of on-farm diversity as a strategy to increase and conserve biodiversity. He has always been one of that rare breed: a scientist who puts the farmer first. He is admired by friend and foe alike for his integrity, his deep knowledge, his vision and his humility.

Melaku Worede

Farida Akhtar

Benny Haerlin

Carlos Correa

David Quist

Johnson Ekpere

Francisca Rodriguez

German Velez

Hope Shand

Ibrahim Ouedraogo

Jack Kloppenburg

Joseph Keve

Laxmamma

"As is already happening in my country, farmers and national gene banks in developing countries can work together to preserve and expand crop genetic diversity on behalf of all humanity." You said this around the time you won the Right Livelihood Award, and this type of collaboration is something you managed to put into practice in Ethiopia, defying the status quo at the time. Where do you think this kind of collaboration is today and where is it going?

I set up the Ethiopian Seeds of Survival (SOS) programme with the support of USC Canada, and it still continues in a few countries. Importantly, it is not a stand-alone programme, but incorporates many issues, including agro-biodiversity. In Ethiopia, the Ethio Organic Seed Action (EOSA) has incorporated the SOS programme, and has also developed community seed banks. The SOS Ethiopia work on farmers' varieties also involved collaboration with the plant breeding programme at the Debre Zeit Research Station. The SOS work continues, in other places too – such as Mali, south-east Asia – but it is happening at a very slow pace.

It's a pity that gene banks almost always ignore this approach of working with farmers. They fail to link *ex situ* with *in situ* conservation. Particularly in areas with great diversity, there are few initiatives where this collaboration is happening.

From a global perspective, the single focus of gene banks seems to be on collecting and preserving whatever samples they can find, and they call that conservation. We, on the other hand, believe in conservation through use, in keeping diversity alive as you use it, without compromising the diversity already built up over centuries by farmers. But this approach is taken in far too few cases.

Why is this? It seems so obvious that this type of conservation should be a complementary approach?

There are two major reasons. In the first place, you at GRAIN, Pat Mooney at ETC, myself and others discussed this issue at international forums many years ago. But already strong arguments were being made against working with farmers. Many scientists were arguing that "land races", as they called them, had no place in breeding, no more potential than already "improved" varieties. They argued that *in situ* conservation was of no use for cultivated species, but only for wild relatives of the cultivated species.

Since then, we have done the work in the field in Ethiopia, and this has helped to push our view forward. We could show that it was possible to work with farmers and to keep that diversity alive in collaboration with them. We also showed that we could do this by using farmers' criteria. It was clear from our work that *in situ* conservation is best undertaken in collaboration with farmers, as this ensures there is almost no loss of diversity.

The second argument that continued to constrain this approach of working with farmers was the issue of yield. We were told that if you want to

feed people you have to follow a model that can increase yields. It was argued that you only could take good characteristics from farmers' varieties and incorporate them into improved varieties. But of course that meant high-input farming.

In our experience yield was not the most important criterion for farmers; they had a wide range of requirements, such as diversity in seasons, topography, and so on. For them the first criterion was sustainability. But it was important to prove that we could raise productivity without compromising diversity. And this is what we did through the work we did on farmers' varieties.

What we did as scientists was to ask the farmers to select. Farmers know what they want and they always select for diversity. Then as a scientist you look for varieties that are promising in yield, but you maintain diversity within that population. In this way you complement what the farmers have already selected. You are pushing a little bit, but the qualities are already there in the varieties. Yield is complex, and determined by a number of factors, so you can combine yield with the farmers' criteria. This approach enhances diversity in the field, rather than reducing it.

We need diversity for food security because uniformity is not secure. Imagine if you reduced all seed to one type – we will lose everything. One of the most important strategies that farmers have developed over centuries is to spread the risk between three factors: season, location, and diversity. So their varieties will have enough plasticity to allow them to grow in diverse conditions. Diversity within the population is as important as between different crops.

Recently we have seen an intensifying, systematic approach of putting seeds away in gene banks, with the seed vault in Svalbard, Norway being a high profile example. What do you think is driving this and how do you view this trend?

If the intention is to build Noah's Ark, to capture everything and thus save the the world, it will not work. What will work is on-farm conservation and conservation through use, working with farmers. A gene bank that is described as doing conservation, but which does not incorporate collaboration with farmers, is only doing preservation, not conservation.

Conservation is about keeping diversity in a dynamic state. Gene banks like the SADC gene bank, the Svalbard gene bank, and many others, focus only on collecting and preserving. How can you think you are conserving diversity when the very source upon which the seeds depend is not included? You can capture only so much, and in 100 years it will be useless because the planet will have changed. Perhaps you will be able to incorporate some genetic material into varieties and release them, but who is going to benefit from that? That is the big question.

Big companies can benefit, because they have all kinds of novel techniques to extract specific genes, incorporate genes. Farmers want what they can sustain in the future. If we focus only on gene banks, we will all be at risk. It is like clapping with one hand.

The priority is to start with diversity in the field. Farmers have been the custodians of biodiversity, and they need support. It is high time there was much more funding for this work. We lose everything if we lose diversity in the field.

With gene banks, if there is no connection with the farms, which are keeping everything alive, there is no point, it makes no sense to me. I am not saying that they should not happen at all, but they are out of place if they do not include farmers from the word go.

In the 1980's, farmers' rights were put on to the international agenda at the FAO under your leadership, as a strategy to counter intellectual property rights (IPRs) and support on-farm seed saving. Now, 20 years later, the FAO Treaty has incorporated Farmers' Rights, but also accepts IPRs. How did we end up in this situation?

We are always in the woods – lots of committees but no action. The important thing about farmers' rights is to ask ourselves what we are referring to. Unless it translates into action that works on the land there is no point to it. I have not seen many examples of initiatives where farmers are encouraged and supported to organise themselves, to be independent of external sources of seeds as well as having their own production materials.

At the same time, the giant companies are pushing communities and even governments to follow their model. They present to them the miracle of yield, a lot of food production. It is most important to be empowering communities so that they can use their knowledge, and this can be done in synergy with science to allow better progress. These are the issues we have to focus on.

Huge amounts of money are now being devoted to the development of African agriculture, including seed systems, with the Bill and Melinda Gates Foundation pumping money into a new Green

"Mixing diversity"

"In Zambia, I came across farmers in one place where they complained about a health problem. I asked them what they had grown in the past. And they said sorghum, of course. So, I said that this could be the reason for their health problem, as sorghum is high in iron compared to maize. They said, yes, we know we have to go back to our sorghum. We still grow it, as we do not want to lose it, but on a smaller scale.

So, where a crop has been officially displaced – you may still find something.

Then in Malawi, we saw something very interesting. Farmers were already dependent on hybrids, but they were unable to afford new seeds each year. They grew second-generation seeds because they had no choice. They were also mixing the hybrids with local seeds. There will always be some knowledge that will come up that is good. Scientists call this process introgression – the farmers' variety and the hybrid seed intercrossing. The farmers select what they want and what will grow well in their area, and some of the good genes are incorporated into the local variety. Their selection was biased in favour of the local type, but gradually they came up with a new population. Farmers always find a way to combine new with old, this is nothing new – they mix and select what suits them."

Revolution for Africa. Do you think they will succeed in their objectives? What is the likely impact of this programme?

Frankly, this is not what we need. How participatory is this going to be if it is a regional programme? Even for national programmes this is a problem, as many of us who have been following the conventional breeding system have seen. At best a conventional national programme can look for indigenous material, and come up with varieties that will then still demand a lot of input from farmers to be able to grow them. But an initiative of such geographical scope will not be farmer-led, and the basis of the knowledge lies with the farmers. Those behind these programmes are behaving as the CGIAR used to, believing they know everything and just incorporating some genes from farmers' varieties.

GRAIN recently published a critique of Nerica rice [see Briefing]. It would be good to hear your take on Nerica, as it is seen by many as a participatory breeding process that will benefit African farmers.

Nerica is interesting, very tempting, and has some merit. The problem that I see is whether it is going to be a stand-alone variety? If we end up using only that, we are in big trouble. It has a place, but not to replace others. It is again a question of keeping things in balance, not relying on one variety only.

From what I can see, even though Nerica has a gene complex that has more adaptive potential than other modern varieties, we are not sure about its plasticity, its ability to grow in different environments. You should select more towards the local type while retaining the characteristics that allow for adaptive potential in populations and species. Then you can come up with a superior type, on plasticity, yield, and so on.

If we all hang on to one string, the string will break. There are now lots of new stresses, including changes in climate, and even indigenous seeds will have trouble adapting to these changes. In the past the pace of co-evolution was ok. But now changes are happening so fast that it is not so easy to adapt. If you grow only Nerica, you will lose the farmers' varieties and also the wild relatives of the cultivated ones. You will destroy continuity, sources of genes, and the capacity to have something in reserve.

The second question about Nerica is how much dependency there is on suppliers. Are farmers saving their own seed? From what I understand, farmers are all lining up to get the seed, which is in high demand. But farmers should be able to save their own seed.

People got very excited about Nerica, because it is a bridge between modern and indigenous varieties, as it combines both. But we cannot get carried away with the notion that we have now struck a balance between improved and indigenous varieties. If we use Nerica to undermine other local rice varieties, it is just as bad as replacing the farmers' varieties with other improved varieties.

We see a lot of change, and it is happening fast. The question remains: can Nerica withstand that kind of change? In may become vulnerable within five or ten years. Relying on this one variety, no matter how meritorious, is risky. You hang from one string, which you are not sure of. The best

policy is to diversify your source of seed and not to become dependent on one variety.

You have already touched on our next question: one of the big challenges facing farmers in Africa now is the climate crisis. Can you already see the impact and do you think farmers and farmers' seed will be able to adapt in time?

I have my worries here, because these things are relative. Farmers' varieties are relatively much more sustainable, better adapted, and have more plasticity to be grown in different locations. If drought strikes here, you grow it over there. But now the changes may be beyond the capability of farmers to predict and adapt.

I see a crisis, and we have to be proactive because we know that sooner or later the farmers' varieties will not be able to evolve at the same pace as external change. The crisis is combined with food insecurity – population growth, land fragmentation, and many other global crises. Production is being jeopardised to a great extent. Nobody has actually measured what is happening on the farms in developing countries. The trend is very scary. In the case of climate change, the farmers' varieties on their own need to be reinforced to meet these challenges, and we have to start now.

We also have to look to the various wild plant species growing in the surroundings and within the field, as they are hardier than those that are cultivated. We must not lose this source of genes, but create systems to keep them alive. These are the crops of the future and we may want to speed up that work. We must develop programmes to enhance farmers' varieties, to make the promotion and conservation of diversity a priority, and to catch up while we still can. If we do it later in a reactive way, it will be too late.

How do you see the role of seed exchange networks? For example, farmers surviving in dry areas – do they have a role to play in exchanging seeds with other farmers?

This is something we must all promote. Farmers' varieties go beyond boundaries; farmers were connected in the first place and they exchange anyway, but we can support them.

This flow of genes and seed material has been jeopardised quite badly, especially in southern Africa, where there is very little surviving diversity and a crisis is looming. A lot of seed is gone. But it is not hopeless; it can be restored from other regions. You can reintroduce through exchange, in a mutually supported and beneficial way.

It is very important to have a farmers' seed-exchange network, supported by advocacy, because we need policies to support it. Community seed banks can address many problems as long as they are connected to each other, so that they can knowingly cross-fertilise each other in terms of seeds and knowledge and protect each other against activities that that will harm them. This can work as long as they are not just storage places, but make up a complex system, with farmers in control.

We need a flow of materials that farmers know about. Without their knowledge, we can forget about it.

Can you explain a bit more how this would work?

If you look at a variety you can trace it back to various locations where farmers are growing it. It follows a continuum. For example, in Ejere you can have a farmers' variety of wheat. You start from that and follow the line where this variety is grown till where it stops. You may end up in Wollo. Here you may see small changes in the types that dominate, but essentially it is the same variety. There are all kinds of scientific explanations, but the important thing is that you can follow a line of farmers who have these varieties.

It is about pinpointing the plasticity, showing how far the farmers' variety can be found from its place of origin. Take sorghum, for example: some types grow only in one place, others can grow in different locations, but not in exactly the same way.

My worry is that if you go to the SADC region, these contours are broken everywhere, because the big farms have taken over and there is discontinuity. But you may find fragments, and you can reintroduce varieties from elsewhere. A baseline study is very important to find out what farmers were growing and to use that as a basis to promote this approach.

Government institutions cannot do this on their own; global funding is needed to help this process along. But it is important to take regional measures; we should encourage governments to add that to their agenda. NGOs and others should also play a role catalysing such a process.

Where diversity exists, make sure you promote it and not lose it.

Where diversity is eroded, make sure you reintroduce it and enhance it.

M Lorenzo Beulas Hurtado

N Ndiogou Fall

O Sharif Omar

P João Pedro Stédile

Q Darrin Qualman

R Ramón Vera

S Daycha Siripatra

T Tim Lang

U Ulrich Oslender

V Valentina Hemmeler Maïga

W Melaku Worede

Leading the assault

Since winning a referendum in February that will allow him to stand for re-election in 2012, Venezuela's President Hugo Chávez has radicalised. Saying that he wants "to accelerate the transition to socialism", the president has focused much of his attack on the food industry. In early March he ordered troops to occupy the country's rice mills, after accusing manufacturers of circumventing government controls by supplying flavoured rice instead of basic white rice, the price of which is controlled by the authorities. "They invent flavoured rice, which is more expensive, because it means higher profits", Chávez said. "They've denied they're doing this 100 times. But I'm tired of it."

This move was accompanied by a flurry of other measures. Chávez told the Grupo Femsa, a subsidiary of Coca-Cola, that it had two weeks to vacate a plot of land used as a parking lot for its delivery vans to make way for housing for the poor. He also expropriated a 1,500-hectare eucalyptus plantation owned by Smurfit Kappa, a large Irish package and paper manufacturer, saying that the trees were doing serious ecological damage by depleting the aquifer.

All worthy measures, no doubt, which pleased the president's supporters. But do they take the country closer to socialism? We have yet to be convinced.

Peasants, like pandas, are to be preserved

In a recent article in *Foreign Affairs*,[1] Paul Collier, professor of economics at Oxford University, wrote provocatively of the need to put an end to "the middle- and upper-class love affair with peasant agriculture". Because of the near-total urbanisation of both these classes in the USA and Europe "rural simplicity has acquired a strange allure.... Peasants, like pandas, are to be preserved. But distressingly, peasants, like pandas, show little inclination to reproduce themselves. Given the chance, peasants seek local wage jobs, and their offspring head to the cities." He goes on: "Reluctant peasants are right: their mode of production is ill suited to modern agricultural production, in which scale is helpful.... Far from being the answer to global poverty, organic self-sufficiency is a luxury lifestyle. It is appropriate for burnt-out investment bankers, not for hungry families."

So, by constantly promoting peasant agriculture as the way forward, are we in GRAIN romantic idealists? Not everyone thinks so. In January 2009, two US professors (Carol Thompson and Lucy Jarosz), together with an activist, William Aal, wrote a stinging response to the Collier article.[2] "We disagree quite strongly with Collier's derisive depiction of 'peasant agriculture'.... This overly general category of 'peasantry' seems to include the very diversified category of small-scale farming, which comprises the majority of farm operations throughout the world. These smallholders (often female farmers) are highly entrepreneurial and innovative." They continue: "Commercial agriculture, according to Collier, may increase yields 10–20 per cent. Yet long-term analyses from the UN Food and Agriculture Organisation (FAO) demonstrate, across the globe, that 'best practices' of smallholder agriculture will double yields. 'Best practices' include sharing of seeds (farmers' rights), research following farmers' requests, available and affordable credit and, yes, agricultural extension." Very much the kind of thing we have been saying for years.

Now that the boot is on the other foot...

For many years the US authorities have been promoting Monsanto's genetically modified crops around the world, insisting that there is no need for governments in the South to carry out their own independent health and environmental tests. But – surprise, surprise – the US authorities are not quite so keen to accept on trust imports of GE rice from China. A recent USDA audit report alerted:

> "They [other nations] have also begun developing transgenic plants and animals of their own. Some of these new plants and animals will be unknown to, and therefore unapproved by, the U.S. regulatory system. As this trend continues, other nations could begin exporting – inadvertently or deliberately – unapproved transgenic plants or animals into the United States."

It continued:

> "While the consequences of the unapproved transgenic plants or animals entering the U.S. food supply are difficult to foresee, such an event could provoke health and environmental concerns and interfere with commerce." China "has committed to investing US$500 million in biotechnology by 2010 and has recently announced the creation of a new transgenic rice. To mitigate any risks to the U.S. environment, agriculture, and commerce from unapproved transgenic plants and animals entering the U.S. food supply, USDA will need to monitor such developments closely."

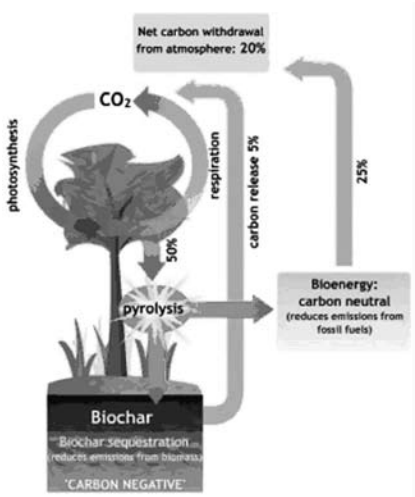
The full USDA Audit Report can be viewed at:

http://tinyurl.com/cu9lzs

1 Paul Collier, "The Politics of Hunger – How Illusion and Greed Fan the Food Crisis", *Foreign Affairs*, November/December 2008
2 Available on the Stuffed and Starved website. http://tinyurl.com/d455uy

This section of *Seedling* is devoted to short topical items. We welcome contributions from readers. Please send them to seedling@grain.org or to our postal address in Barcelona.

Biochar: the latest technical fix for climate change



At the UN climate conference in Poznan last December, a new proposal for "climate change mitigation" was formally submitted. The idea is to apply vast amounts of fine-grained charcoal, called "biochar", to soil in the hope that it will form a permanent "carbon sink", as well as improving fertility and restoring "degraded lands". Charcoal is a by-product of a process in which biomass is exposed to high temperature in the absence of oxygen. The process, called pyrolysis, can be used to produce heat and power. It is particularly attractive to the agrofuel industry as a first step for producing "second generation" agrofuels from solid biomass.

Proponents claim that biochar is "carbon negative" because the charcoal sequesters carbon. Lobbyists such as Tim Flannery, Peter Reid and Johannes Lehmann say that by converting hundreds of millions of hectares of land to biochar plantations and burying the charcoal in soil, we can take carbon dioxide out of the atmosphere and cool the planet down.

None of the claims made by the biochar lobby has been proven: there are few field studies, none of them long-term. Although ancient charcoal-rich soils created by indigenous peoples exist (such as *terra preta* in the Central Amazon), this is very different from modern biochar. Carbon in charcoal can remain in soil for very long periods, but it can also be lost quickly. No one knows if biochar would remain stable in different soils. There is also evidence that charcoal increases soil microbial activities which can turn carbon in the soil into atmospheric carbon dioxide.

The only certainty is that, if it is given the go-ahead, biochar will produce profits for industry. The governments of Micronesia, Belize and 11 African countries are formally supporting a proposal that biochar should be made eligible for large-scale carbon credits through the Clean Development Mechanism. Without strong opposition, there is every chance that the UN climate conference in Copenhagen will put in place unproven measures to ensure yet another major land-grab in the name of "climate change mitigation".[3]

A stinging attack on Monsanto[4]

A quirky alliance that brings together organic farmers, anti-capitalism activists, churches and politicians from the conservative Christian Social Union, the Bavarian sister party to Chancellor Angela Merkel's Christian Democrats, is seeking to expel the biotechnology giant Monsanto from Germany. The latest phase of the dispute involves an amateur beekeeper, Karl Heinz Bablok. When he wants to relax after his shift in a BMW factory, Bablok gets on his bike and pedals to Kaisheim, a quiet town in south-west Germany where he keeps his beehives. Bablok got involved in the controversy because he realised that some of his bees were collecting pollen from fields where the Bavarian State Centre of Agricultural Research is carrying out tests on Monsanto's GM maize (MON 810). He asked the authorities to test his honey to see if it had been contaminated.

To Balok's dismay, the tests showed that up to 7 per cent of the pollen collected by his bees came from GM maize. A local court decided that Bablok was not allowed to sell – or even to give away – his honey. He became the first beekeeper in the country's history to be told to send his honey to an incinerator. He is now suing the agricultural centre and demanding €10,000 in compensation. It is proving a complicated case and has already been referred upwards twice. A third court is due to reach a decision soon. Bablok has received a great deal of public support. It seems clear that a decision in Bablok's favour would be seen by the public as definitive proof that GM crops pose a risk to human health, and that it is perhaps time for a badly stung Monsanto to leave the country.

3 For more information see Almuth Ernsting and Rachel Smolker, "Biochar for Climate Change Mitigation: Fact or Fiction?". http://tinyurl.com/csfl4a. To find out more about biochar and the case against it, contact biochar_concerns@yahoo.co.uk

4 For a fuller account of this dispute, see Uwe Buse, "Monsanto's uphill GMO fight in Germany", *Business Week*, 6 March 2009. http://tinyurl.com/cfcefm

In April 2008 GRAIN published a short report[1] on the huge profits that agribusiness was making from the food crisis. Another year has passed. More financial results are in. So has anything changed?

Corporations are still making a killing from hunger

GRAIN

Last year, at the height of the global food crisis, many of world's largest corporations had just finished reporting their financial results from 2007. With people in many parts of the world protesting in the streets because they could no longer afford to eat adequately, one agribusiness giant after another shamelessly came forward to announce record profits. For grain traders like Cargill and ADM, seed and pesticide companies like Syngenta and Monsanto and fertiliser companies like Potash Corp and Yara, there was never a better time for their bottom lines.

Now another financial year has passed. As the food crisis continues, with over a billion people suffering acute hunger, and as the financial crisis wreaks havoc on the solvency of companies in other sectors, the agribusiness corporations that control the global food supply are getting even richer. For many firms, their 2007 record profits pale in comparison to what they made in 2008.

Cargill, the world's largest grain trader, reported an increase in profits of nearly 70 per cent over 2007 – a 157 per cent rise in profits since 2006. Profits for ADM, the world's second largest grain trader, declined slightly in 2008, partly because of its heavy investments in the sinking US ethanol market, but the company's profits were still 41 per cent higher than they were in 2006. Wilmar International, one of the largest palm oil producers and traders in the world, saw its profits jump from US$288 million

1 See GRAIN, "Making a killing from hunger", *Against the grain*, April 2008. www.grain.org/articles/?id=39

Table 1: Profits* for some of the world's largest grain traders

Company	Profits 2008 (US$ million)	Increase over 2007 (%)
Cargill (USA)	3,951	69
ADM (USA)	2,624	–17
Bunge (USA)	1,363	13
Noble Group (Singapore)	436	117

*Profits = Earnings before taxes except for Noble Group where Profits = Gross Profits

Table 2: Profits* for some of the world's largest fertiliser companies

Company	Profits 2008 (US$ million)	Increase over 2007 (%)
Potash Corp. (Canada)	4,963	164
Mosaic (USA)	2,682	430
Yara (Norway)	3,350	131

*Profits = Earnings before taxes

in 2006, to US$829 million in 2007, to US$1,789 million in 2008 – a greater than 6-fold increase in two years. Wilmar, in fact, made more profit in the fourth quarter of 2008, when commodity prices were supposed to have fallen, than it did in the whole of 2006. Asia's largest agribusiness corporation, Charoen Pokphand, which is by now the world's top animal feed and shrimp producer and second largest poultry producer,[2] had a similar banner year. In the fourth quarter of 2008, CP's net earnings doubled, with profits for the year up 145 per cent.

The suppliers of agricultural inputs may be the biggest winners from this crisis. With their quasi-monopoly control over seeds, pesticides, fertilisers and machinery, they were able to maximise the squeeze on farmers. The profits for these companies in 2008 were nothing short of obscene, especially for the fertiliser industry. Mosaic, partly owned by Cargill, saw its pre-tax profits shoot up 430 per cent in 2008.

Table 3: Profits* for some of the world's largest seed/pesticide companies

Company	Profits 2008 (US$ million)	Increase from 2007 (per cent)
Monsanto	2,926	120
Syngenta	1,692	19
Bayer	1,374	40
Dow	761	63
BASF	894	37
*Profits = Earnings before taxes		

Table 4. Profits* for some of the world's largest agricultural machinery companies

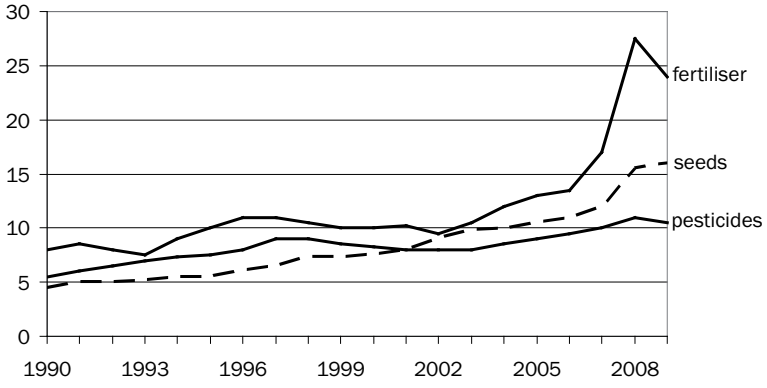
Company	Profits 2008 (US$ million)	Increase from 2007 (per cent)
AGCO	526	61
John Deere	3,124	17
Case/New Holland	1,156	39
*Profits = Earnings before taxes		

No bailouts needed here

But, as in 2007, all of this profit-taking through selling inputs to farmers and moving harvests around the world did little damage further downstream to the food processors and the retailers, who run their own quasi-monopolies. As a result, Nestlé's profits for 2008 were up an impressive 59 per cent, and Unilever's surged ahead by 38 per cent. On the retail side, Casino's profits for 2008 rose 7.3 per cent and Ahold's 12.2 per cent. Profits in the fourth quarter of 2008 for the world's largest retailer, Wal-Mart, dipped slightly, which is not surprising given the deep recession in the US. It still raked in US$3.8 billion during that period.

Some reports are also emerging about the income of farmers in 2008, and these figures speak volumes about who currently holds power in the food system. The reports show large increases in prices at the farm gate and increases in overall farm revenue, but any potential income gains for farmers were gobbled up by higher prices for inputs and other costs of production. In North America, for example, national statistics bureaux point to rising input costs to explain why in Canada the net operating income for the average farm was down 5 per cent in 2008. Net farm income in the US is forecast to be roughly where it was in 2007. In the US, production expenses for farmers have increased by US$100 billion in the last five years and now eat up 77 per cent of gross farm income. Since 2002, the price of fertiliser has risen by 191 per cent and the price of seed by 71 per cent.[3]

Figure 1: Expenditure on farm inputs in the US agricultural sector (billion dollars)



Source: Economic Research Service, USDA

In case it wasn't clear before, 2008 exposed for all to see how the current global food system is designed to leave many hungry and make a few very rich.

2 David Burch, "Overview of agribusiness trends", presentation to the AAI Second Global Forum, "Market power and the world food crisis", São Paulo, 22–24 January 2009. http://tinyurl.com/cjvwuq

3 Agriculture and Agri-Food Canada, "Farm Income Forecast Highlights: 2009". http://tinyurl.com/c6tnc4 and Stu Ellis, "Farm Income And Expenses For 2008: The Very Big Picture", *The Farm Gate*, University of Illinois, December 1, 2008. http://tinyurl.com/dzvlkf

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The WHO's global surveillance system acts as a free virus collection and R&D department for the world's largest vaccine companies, yet gives very little benefit back to the developing countries in terms of available vaccines. Angered by the inequity, Indonesia decided in 2007 to suspend its sharing of viruses with the WHO. This action sent shock waves around the world. It alerted many developing nations to the need for reform, while provoking companies and the developed nations to fight to maintain the status quo. The outcome is still to be determined, while the world awaits the next pandemic.

Indonesia fights to change WHO rules on flu vaccines

EDWARD HAMMOND

In mid-2005, Indonesia began to suspect that something was badly wrong with the World Health Organisation's influenza virus research system. In July of that year, a virulent new strain of the H5N1 "bird flu" cropped up in Indonesia, infecting poultry and, worse, people.[1] The world watched Indonesia, fearful that the virus might start spreading from human to human (and not just from poultry to humans), potentially triggering a pandemic.

In late 2005, as the new virus type (called a "clade") infected poultry, and several more human victims died in Indonesian hospitals, officials scrambled to respond to the unprecedented crisis. Previous outbreaks had occurred in other parts of south-east Asia, where officials had similarly struggled (and continue to struggle) to contain them.

Indonesian health officials encountered disturbing problems. The antiviral drug Tamiflu, made by Switzerland's Roche, was not available to them in large quantities at any price.[2] Although it has since lessened in importance, at the time Tamiflu was considered critical for treating and containing human infections. But rich countries had already locked up the supply, even though they were not the ones suffering H5N1 outbreaks.

In addition to difficulty in acquiring drugs, Indonesia's health and agriculture officials often faced criticism from abroad, as they worked to stamp out infections.[3] Many foreign commentators were unreasonable, and had little or no specific knowledge of circumstances in Indonesia. Often they based their criticisms on sources of questionable reliability, for example, nearly unintelligible and error-prone computer translations into English of Indonesian news articles written in Bahasa.[4]

Another source was Andrew Jeremijenko, a disaffected Australian general medical practitioner working in Indonesia. Jeremijenko held jobs with the international petroleum industry in Indonesia

1 International Society for Infectious Diseases, "Avian Influenza, Human – East Asia (125): Indonesia, Confirmed", ProMED-Mail, Archive No. 20050916.2736, 16 September 2005. http://tinyurl.com/b9v9e8

2 Personal communication with Indonesian Health Ministry Officials, 2006–7. See also US Embassy, Jakarta, "Questions and Answers on Avian Influenza (Adapted from the U.S. Centers for Disease Control and Prevention and the World Health Organization websites)", updated 9 December 2005. http://tinyurl.com/czplu8
Andrew Pollack, "Governments Pressing Roche For More of Its Flu Medicine", *New York Times*, 20 October 2005. http://tinyurl.com/chkr6x

and, simultaneously, at a US military laboratory in Jakarta called NAMRU-2, which was closed by Indonesian authorities in late 2008 (*see* Box 1).

Jeremijenko's tenure at the US military lab had ended in early 2006, and included friction with Indonesia's health ministry over handling of H5N1 samples. Now a telemedicine entrepreneur (and local political candidate in a Brisbane suburb in 2006–7), Jeremijenko's criticisms of the Indonesian government were frequently accepted at face value by news media and public health commentators in the North.[5]

Despite the criticisms, and as has been customary for more than four decades, Indonesia shared the H5N1 viruses isolated from its victims with the WHO Global Influenza Surveillance Network (GISN). As is also customary, the viruses were shared without any material transfer agreement (MTA) or other document articulating rights over them.

Not long thereafter, an Indonesian virus from the 2005 outbreak was selected by WHO GISN for use in vaccines. Indonesia was displeased to learn that, although the virus was sent by WHO labs to companies and other researchers, vaccine made from it would not be available to Indonesians.[6] Later, when patent claims on this and other H5N1 viruses emerged, Indonesia's discontent grew further.

How did it come to pass that WHO's global surveillance system acts as a free virus collection and R&D department for the world's largest vaccine companies, with familiar names such as Sanofi-Pasteur, Novartis, and Astra-Zeneca, yet gives very little benefit to developing countries?

Photo: GRAIN

Chickens from a factory farm being sold at Ha Vi market, Ha Tay Province, Vietnam

Global virus vacuum

The GISN is WHO's influenza laboratory network.[7] It exists to identify and characterise influenza viruses and to create and distribute virus seed strains that can be used to produce vaccines. The key labs in the system, called WHO Collaborating Centres, are all located in wealthy countries – Japan, the US, the UK, and Australia. Of these, the dominant facility is the US Centers for Disease Control in Atlanta, part of the US Department of Health and Human Services, whose technical capabilities significantly outstrip the others.

Although the GISN in theory exists as a WHO-led international public health collaboration, in many respects it can be more accurately described as a global virus vacuum, acquiring and processing thousands of influenza samples every year, determining which are most appropriate for use in vaccines, and then handing over those strains and vaccine selections – for free – to industry, which is 90 per cent concentrated in the North.

Although industry is the primary beneficiary of the WHO GISN, it views countries like Indonesia not with gratitude for providing viruses, but as markets. And since demand for influenza vaccine in the event of a pandemic will far outstrip production capacity, industry is uninterested in contracting to provide vaccine at affordable prices for developing countries, even if the wealthy countries where the vast majority of vaccine antigen is produced were to allow exports in the event of a global influenza crisis (which many observers find very doubtful).

Best of all for industry, the international movement of influenza (and other) viruses in the WHO system has historically ignored the concept of sovereignty over genetic resources, and the equitable sharing of benefits derived from them. Thus, no protections against patent claims by companies and others are built into the WHO GISN system, nor do the Terms of Reference and other agreements that govern its operation reflect a significant commitment to equity and benefit sharing.[8]

As a result, even though Indonesia and other countries cooperated with GISN labs that had been approved by and signed Terms of Reference with the World Health Organisation, they lost all legal rights over viruses sent to the WHO system. When attention later focused on a wave of patent claims being filed on GISN H5N1 viruses (*see* below),

3 See, for example, Peter Cave, "Failed Indonesia bird flu response concerns experts", Australian Broadcasting Corporation, 25 February 2006. http://tinyurl.com/l7z2m

4 See, for example, the active website Flutrackers.com, particularly its news forum. http://tinyurl.com/dfykxj

5 See Peter Cave, "Failed Indonesia bird flu response concerns experts", Australian Broadcasting Corporation, 25 February 2006 http://tinyurl.com/l7z2m

6 Reuters, "Indonesia defends move to block virus sample sharing", 16 July 2008. http://tinyurl.com/cl4paa

7 The Global Influenza Surveillance Network's web pages can be found on the WHO website. http://tinyurl.com/cf76xa

8 See Core Terms of Reference for WHO Collaborating Centres for Reference and Research on Influenza, 12 October 2006 version. http://tinyurl.com/c6tnue

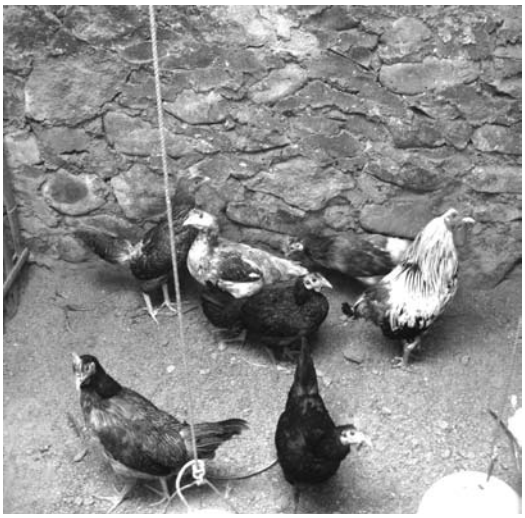


Photo: GRAIN

Kampung chicken at a farm in Sukabumi, West Java

tensions grew. The fact that some of these patent claims were made by WHO GISN labs[9] themselves made matters worse, and showed WHO's lack of interest in preventing predation of GISN's public health goods by private interests.

Indonesia in the dock

Until 2007, WHO's virus vacuum had operated for four decades with few objections being raised. However, fears of a new pandemic focused attention on influenza and, as a result, the GISN's overt inequity became apparent. Stung by critics, a senior WHO official recently privately lamented that "nobody used to care about influenza", suggesting – with some reason – that WHO Member States' historic inattention to the GISN was in part responsible for its problems.[10]

In 2007, with developing countries largely still unable to access H5N1 treatments, and the WHO Secretariat still embarrassed at the GISN's inequity having been revealed, Indonesia suspended its sharing of viruses with WHO and came to the World Health Assembly (WHA) in Geneva determined make big changes to the WHO's system.[11]

Indonesia's suspension of virus sharing sent a shock through the international scientific community and vaccine makers. Without access to Indonesia's virus, H5N1 vaccine research and development in the North would be seriously impaired. Indonesia also objected to the patenting of GISN materials, raising concern from industry and other labs that viewed the GISN's resources as free for appropriation.

The suspension brought on another wave of international criticism, including from the WHO, which harshly accused Indonesia of "threaten[ing] global public health".[12] This and other criticisms were picked up by news media and on the internet. Few of Indonesia's critics, however, knew what the GISN was, let alone understood how it operates.

Ignorance of the GISN and intellectual property issues among public health commentators and health writers commingled in a distorted feedback loop between press and bloggers, resulting in several articles erroneously asserting that Indonesia was claiming intellectual property rights over viruses and that this was interfering with the GISN's public health work.[13] The reality was the complete opposite. Indonesia had not claimed intellectual property over any virus, had disavowed profiting from the virus and, in fact, one of its key objections was that WHO was allowing patenting of GISN materials.

Many developed countries seemed caught off-guard by Indonesia's determination to change the GISN. A series of WHO meetings have ensued since the 2007 World Health Assembly but have yet to agree on a solution. As it became clear that Jakarta was not content to merely register a protest and then resume the business of sharing viruses as usual, developed countries placed a series of obstacles, many still unresolved, in the path of reforming or replacing the GISN to make it fairer to developing countries.

For instance, the US at first refused to accept that virus transfers should be conducted using an MTA. US negotiators said that this would be too burdensome, despite the fact that influenza viruses are routinely transferred inside the US using highly detailed MTAs, including when they are shared by US government agencies.

The US and others also scrambled benefit-sharing language when it crept into the draft resolution, for example turning "access to genetic resources [viruses] and sharing of benefits arising therefrom" into "mandatory sharing of viruses in return for access to vaccines through regular market mechanisms".[14] In other words, it fought for the status quo, resisting any suggestion of inequity in the GISN system.

With EU support, the US has also promoted the idea that the revised International Health Regulations (IHR) require Indonesia to send viruses to the WHO. This would mean that Indonesia was violating an international agreement by not sending viruses to the GISN. But advancing this dubious argument was difficult, not least because the revised IHR doesn't actually require the sharing

9 See, for example, PCT Patent Application WO2007/100584, Antiviral Agents and Vaccines Against Influenza, published 7 September 2007, and lodged by the US Centers for Disease Control and National Institutes of Health.

10 Personal communication.

11 Fitri Wulandari, "Indonesia says WHO must set rules on H5N1 sharing", Reuters, 12 February 2007. http://tinyurl.com/dgmtq8

12 Fitri Wulandari and Ahmad Pathoni, "Indonesia to resume sharing bird flu virus samples", Reuters AlertNet, 27 March 2007. http://tinyurl.com/bqofzk

13 Geoff Thompson, "Indonesia claims ownership over strain of avian flu", Australia Broadcasting Corporation AM programme, 1 February 2007. http://tinyurl.com/alx3d3
Michael Perry, "Indonesia ban risks WHO flu protection system", Reuters, 8 February 2007. http://tinyurl.com/bwqkaf
Maryn McKenna, "Virus ownership claims could disrupt flu vaccine system", CIDRAP News, 19 June 2007. http://tinyurl.com/bjtq9k

14 These are not verbatim quotations, but an eye-witness's paraphrase conveying the flavour of the discussion.

of disease agents. In fact, a draft provision that would have done so was discarded because of US objections!

The WHO Legal Counsel, to its discredit, refuses to put to rest the uncertainty about the IHR that has been created by the US and EU. Only reluctantly does WHO concede that there is no virus sharing requirement in the IHR per se. But when it does so, it invariably also insists on suggesting various ways in which the IHR might be reinterpreted to require virus sharing, thereby perpetuating confusion about actual requirements. The impression left is that the WHO is inappropriately politicking for itself, encouraging Member States to grant the WHO power to compel countries to send it viruses, bacteria, and other disease agents.

A pandemic of patents

Since 2007, NGO research has documented a recent and dramatic increase in patenting of influenza vaccines, especially H5N1 vaccines. This includes patent claims over WHO GISN materials shared by countries such as Indonesia, Thailand, and Vietnam. Not only have claims been made by private industry, they even extend to two WHO Collaborating Centres for influenza – the Centers for Disease Control and St Jude's Children's Research Hospital, both in the US.

A hastily organised WHO consultation in Singapore began on 31 July 2007, only weeks after the WHA. Although the Singapore meeting was privately described by one WHO official as an attempt to "ambush" Indonesian negotiators, the ambush backfired when Indonesia tabled a detailed proposal to restructure the WHO system, including material transfer agreements, improved access to vaccines, and new terms of reference to govern the relationships between the WHO, GISN labs, industry, and developing countries.

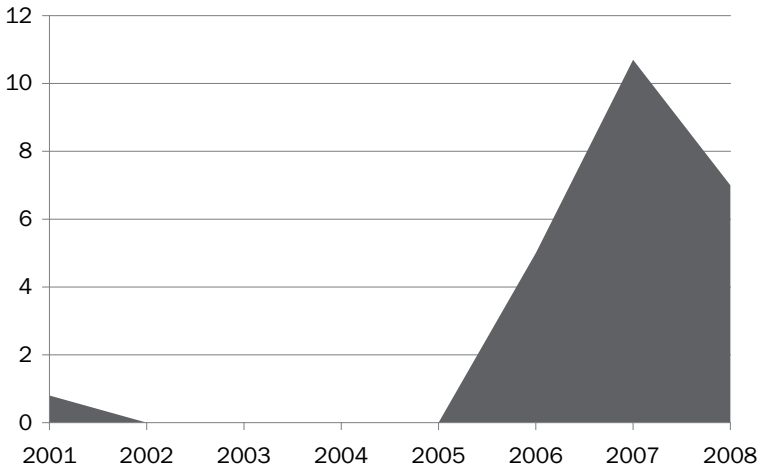
The WHO Secretariat watered down Indonesia's proposal and put forward a "Chair's Text" of largely unexplained provenance.[15] It mostly reflected US and EU positions, but was not introduced by those countries; rather, it simply appeared without explanation. Unsurprisingly, advances at Singapore proved difficult because developed countries were unprepared to negotiate in detail, having arrived instead apparently hoping simply to press Indonesia to drop its initiative. Subsequent negotiating sessions, led by the Australian health minister, have rehashed and reformulated this draft agreement.

It was not until the end of 2007 that signs of progress appeared. The US relented on the matter of an MTA (calling it "standard terms and conditions"), and the WHO began to wake up to modern genetic resource realities. At the end of a tough IGM negotiating session in Geneva, WHO Director-General Margaret Chan confessed to delegates that she hadn't previously understood the positions of Indonesia and its allies, but that after listening to the negotiations she had "come to understand what is meant by equitable sharing of benefits".

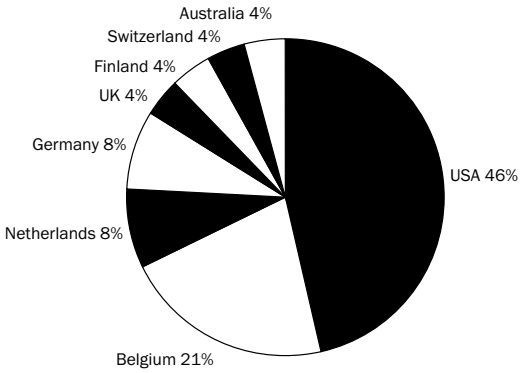
The details, however, matter greatly. Having agreed to a material transfer agreement for WHO GISN biological materials, the IGM's definition of those biological materials becomes highly significant.

Patent applications for influenza vaccines with the term "H5N1" appearing in the patent claim

(number of applications by year – total: 24)



Patent applicants by country



Before 2006, only one international patent application for an influenza vaccine had ever been filed with the term H5N1 in the claim. In 2006 there were five claims, followed by eleven in 2007, and seven by September 2008. US and EU companies account for nearly all applications.

Source: WIPO/PatentScope

15 This first Indonesian proposal was never published as an official WHO document. A proposal subsequently put forward by the African Group, however, reflected many of Indonesia's ideas. The African proposal has been published as an "annex" to WHO document A/PIP/IGM/7. http://tinyurl.com/d62lfp

Box 1: The US Military and Influenza Samples

Naval Medical Research Unit No. 2 (NAMRU-2), the US military lab in Jakarta, is part of a large, little-known network of US military labs that conduct biomedical research and collect disease samples outside the United States. For influenza, the US military system parallels the World Health Organisation's GISN but does not entirely share its public health purposes.

The US military collects influenza viruses in at least 56 countries (as of 2007). These samples are shipped to the US, but only some are sent to the WHO GISN. In 2006, this number was 120 viruses (about 1.5 per cent of those collected), meaning that more than 98 per cent do not enter the WHO system. All are kept by the US military for its own purposes.

The Pentagon claims credit, however, for being the source of several important influenza viruses that have been selected by WHO for use in seasonal and H5N1 vaccines from 2000 to the present. These include viruses from Panama, Peru, Nepal, Malaysia, and Indonesia.

Developed countries including the US have insisted that developing countries may only share influenza viruses with the WHO GISN and not bilaterally. Yet the massive US military virus collection programme contradictorily provides only a very small percentage of what it collects to the WHO.

The size of the programme has more than doubled in recent years. In 2005, it was active in 30 countries and included three high containment (BSL-3) labs with a total processing capacity of 9,000 influenza specimens per year. By 2007, the network was active in 65 countries and included eight BSL-3 labs and the capacity to process 18,000 samples annually.

It is unclear if and how viruses collected by the US military in other countries would be covered by a WHO GISN material transfer agreement because they are obtained and transferred outside what is now understood to be the WHO system.

A US Air Force lab in San Antonio, Texas coordinates the collections. In 2006 and 2007, the systemwide budget was over US$40 million per year. Collected viruses (especially H5N1 viruses) are provided to the US Army Medical Research Institute of Infectious Diseases (USAMRIID) at Fort Detrick in Frederick, Maryland. USAMRIID is the historical home of the US offensive biological weapons programme (terminated in 1969), and is now the headquarters of the US military's biological defence effort.

According to the San Antonio lab, "The principal objective is to enable the rapid discovery of novel strain mutations that could trigger a pandemic and to monitor these strains for their ability to transmit and to cause disease ... the priority of the DoD is to maintain readiness and protect the health of service-members and beneficiaries, the contributions from surveillance program also benefit the greater global health community."

Five overseas labs operated by the US Department of Defense act as regional coordination centres. They are:

- Naval Medical Research Unit No. 2 (NAMRU-2) in Jakarta.
- Naval Medical Research Unit No. 3 (NAMRU-3) in Cairo.
- Naval Medical Research Centre Detachment (NMRCD) in Lima.
- Armed Forces Research Institute of Medical Sciences (AFRIMS) in Bangkok.
- US Army Medical Research Unit-Kenya (USAMRU-K) in Nairobi.

Excepting NAMRU-2, which was recently closed by Indonesia, each of the above labs works not only in the country in which it is located but also in nearby countries, where laboratory and personnel detachments are sometimes placed.

Although the Pentagon's viruses have frequently contributed to WHO vaccine strain selections, none of the negotiating texts or background documents made available by WHO in the course of GISN negotiations have discussed the military virus collection system, much less explained the unusual relationship between it and the GISN.

The influenza virus is very small. Its genome is about 12,500 genetic bases long, which is roughly one fiftieth the size of the smallest bacterium, and a much smaller fraction of that of higher organisms. The HA (hemagglutinin) and NA (neuraminidase) genes, which are of greatest interest for vaccines, are only about 1,750 and 1,350 bases long, respectively.[16]

Small size coupled with a virus-engineering technology called reverse genetics makes lab synthesis of influenza genes and recreation of

16 Edward Hammond, Influenza strains and genes can be copied from sequence data, undermining the WHO flu benefit sharing system, paper prepared for Third World Network, July 2008. http://tinyurl.com/dmh6xo

viruses by machines increasingly easy to accomplish. New technology also makes the virus relatively easy to manipulate genetically. Further, there are technical aspects of H5N1 vaccine development that encourage genetic manipulation of vaccine strains. As a result, even though they remain utterly dependent on WHO for sequence information, acquiring actual virus from the GISN is becoming less necessary for companies and other labs, who are increasingly able to synthesise influenza genes and viruses from published sequence data.

Thus, if the definition WHO GISN materials excludes items such as synthesised copies and viruses that are slightly genetically altered, then companies can avoid proposed MTA requirements such as restrictions on patents as well as benefit sharing, including making vaccine technology freely available or mandatory contributions to a pandemic preparation fund for developing countries.

Now, WHO optimistically hopes that an agreement to reform or replace the GISN, presently called a "WHO Framework", can be finalised and adopted at the World Health Assembly in May 2009. But the current draft text, despite several meetings and iterations, leaves many key issues unresolved, including restrictions on intellectual property, definitions of WHO materials, exact types and requirements for benefit sharing.

The scope of the agreement also remains in question. WHO and developed countries have fought to restrict it to viruses isolated in humans. Yet WHO-selected human vaccines are also made from H5N1 viruses that come from animals, making any agreement that solely pertains to human-isolated viruses of limited utility. In addition, WHO has asked its Member States to send animal viruses to the GISN for a number of years (a fact that WHO officials embarrassingly forgot at an important negotiating juncture). In fact, one of the WHO's collaborating centres, St Jude's Research Hospital in Memphis, Tennessee (US), specifically focuses on collecting and evaluating influenza in animals.

Photo: GRAIN

Poultry for sale at Ha Vi market, Ha Tay Province, Vietnam

Photo: GRAIN

Ade Zulkarnain with one of his local breeds of chicken

While it has been claimed that extending the WHO agreement into animal viruses conflicts with the domain of other intergovernmental organisations (FAO and OIE), in fact, this does not appear to be a major concern. That is because a distinction can be drawn between use of samples for human vaccine development and pandemic risk assessment, versus similar uses directed toward animal health.

Another unresolved issue is the boundaries of the WHO system. Many developing countries propose that the WHO system retain rights over GISN viral materials after they are transferred to industry and other labs. Industry would therefore assume certain commitments whenever handling materials sourced from GISN. The US and others, such as Japan, prefer that once materials are sent to industry then they pass out of the GISN system and, for instance, cease to be tracked by WHO's new virus-tracking system (being implemented at the suggestion of Brazil and others).

(main text continues on page 32)

Box 2: Bird flu in Indonesia and Vietnam

Indonesia and Vietnam are two of the countries in south-east Asia most affected by the continuing bird flu crisis. In July 2008, GRAIN met some small-scale poultry farmers and people involved in the development of policies to deal with the disease. The situation in both countries is deeply troubling. The authorities are using bird flu as a pretext to destroy a highly efficient food system built up over generations. This system provides livelihoods for millions of people, from small farmers to wet market butchers; it is completely sustainable, and reliably provides urban and rural populations with affordable, nutritious food. Now, on the ashes of Asia's richly diverse poultry culture, giant poultry corporations are erecting their modern factories.

Indonesia has suffered more than any other country from bird flu. Across the archipelago, many local and international programmes and policies have been set up to deal with the disease. But practically nothing has been done to deal with the big poultry companies, which are responsible for the initial introduction and spread of the disease. Dr Muladno, the Planning and Development Coordinator of Indonesia's National Committee on Avian Influenza Control and Pandemic Influenza Preparedness (Komnas FBPI), told GRAIN that the government is aware of outbreaks at large farms, even though these are not reported: he mentioned a specific outbreak at a large farm in Subang that was happening at the time but was not being talked about. There is still no legal obligation for companies to report bird flu outbreaks on their farms, and health inspectors cannot legally enter an industrial farm without the owner's permission.

Government policies have, however, had a devastating impact on small-scale poultry operations. Muladno says that roughly 90 per cent of the local chickens in Jakarta were culled and never replaced because of a ban on poultry production within the city. All this for what? The measures did not have the desired effect of reducing human cases of H5N1 in Jakarta. The city remains a hotspot for human bird flu infections: about 70 per cent of the country's human cases occur in the Jakarta region. It is obvious, therefore, that the disease is being trucked in by poultry operations elsewhere in the country. To deal with this, the government is now in the midst of implementing a second round of policies that will ban the transport of live birds into the city, while not lifting the ban on poultry production within the city. The transportation ban will put an immediate end to more than 1,300 traditional poultry slaughterhouses in the city, which supply 80 per cent of the poultry meat consumed in Jakarta and provide for the livelihoods of thousands of small-scale butchers. All of the poultry meat will be shipped into the city by a few large operations that can afford the cold-chain infrastructure that will soon be required.

The same fate awaits Indonesia's many medium-scale poultry farmers. These farms typically have a couple of thousand birds, and often operate under contract to a bigger company. Muladno says that they will either have to grow, with the necessary "biosafety" requirements, or "die". This means that the farmers will either have to go into debt to set up large contract operations with the big companies, or get out. Muladno agreed that about 90 per cent of these medium-scale farmers would go out of business.

The only voice for small-scale poultry farmers on Komnas FPBI is Ade M. Zulkarnain, a small-scale poultry farmer from Sukabumi, West Java. Ade is the Chairman of the Indonesian Native Chicken Community (Keprak), which was formed in 2003 and now brings together 1,800 farmers in 22 (out of 33) provinces. He is also a "founding father" and active member of the Indonesian Local Poultry Farmers Association (HIMPULI), formed in 2007 to help poultry farmers to improve their farming and livelihoods.

Ade's poultry farm sits in the middle of a densely packed village, and it was here, in July 2005, that the first reported outbreak of H5N1 bird flu occurred in local (kampung) chicken. He says that one person and 2,200 local chickens died during that outbreak – 850 of them in the government's cull. He suspects that the bird flu came into the community by way of industrial feed or people working in the industrial operations. Since then, there has not been a single outbreak, even though the area is considered a hotspot for bird flu. In conversation with GRAIN, Ade pointed to a nearby area of big poultry farms, where 500,000 chickens had recently died in an outbreak of bird flu that was not reported by government or media. He said that the company did not even allow government inspectors into the premises.

Ade maintains several rare breeds of kampung chicken on his farm. He says that Indonesia is home to two of the four original ancestors of chicken. These varieties later diversified into 31 strains, with Indonesia thus having the highest poultry diversity in the world. But the industrialisation of poultry production and the response to bird flu, especially the culling, has reduced this diversity until today only about ten are left. Ade feels that the government's culling policy, defined in a 2007 presidential decree, is a deliberate attempt to wipe out kampung chicken.

Ade says that his group and his community had already taken the initiative to "restructure" local poultry production before the government began calling for it. The community came together to share ideas, invest collectively in simple machines (such as feed mills and home-made incubators), and establish joint management of chicken coops and

Countries reporting major H5N1 bird flu outbreaks in poultry to the OIE (+Indonesia)*

Year	Countries
2008	Bangladesh, Benin, Burma, Cambodia, China, Egypt, Hong Kong, India, Indonesia, Iran, Laos, Nigeria, Pakistan, Poland, Russia, Saudi Arabia, South Korea, Thailand, Togo, Turkey, Ukraine, UK, Vietnam
2009 (1st two months)	Bangladesh, China, India, Indonesia, Nepal, Vietnam

Human cases of H5N1 reported to WHO (up to 24 February 2009)*

Total cases:	488
Total deaths:	255
Total cases 2008:	44
Total deaths 2008:	33

Nearly all cases (42 out of 44) and all deaths in 2008 occurred in 4 countries: China (4 cases), Egypt (8), Indonesia (24), Vietnam (6). In 2009, these four countries account for all the cases and deaths confirmed by the WHO and national authorities.*

*Indonesia stopped reporting confirmed cases to the WHO on 5 June 2008 and the government started following a policy of not reporting cases as they occur but only periodically. Indonesia has not reported outbreaks in poultry to the OIE since September 2006, although it is well-established that H5N1 remains prevalent in much of the country. The Indonesian government publicly confirmed four human deaths from H5N1 in the first 2 months of 2009.

vaccination. Their collective actions allowed them to share costs, resources and knowledge and to develop markets. Ade feels that such initiatives should continue to come from the people and that the government should recognise their efforts and provide support. Instead, the government thwarts whatever they propose, either refusing to listen or making promises that it never keeps. For example, a decree that safeguards the control that small-scale farmers have over kampung chicken has been with the government for some time. But in 2006, Charoen Pokphand (CP), the largest poultry company in Asia, started getting involved in producing and marketing its own brand of kampung chicken, produced on its large farms. Ade's group vociferously opposed CP's actions and petitioned the government three times, but the government merrely tried to offer them a "win-win" situation: offering them shares in CP's Indonesian subsidiary if they withdrew their opposition.

Ade is clear that small farms are simply the victims of the big farms when it comes to bird flu. He says that there are no serious outbreaks on small farms; they occur mainly with big producers. He mentioned a 2007 study by the Centre for Indonesian Veterinary Analytical Studies that found that 84 per cent of the poultry at wholesalers in Jakarta, practically all of which is transported into the city by the big poultry companies, was infected with bird flu.

Ade and other poultry farmers in his community and elsewhere in the country are doing what they can to manage the disease. But their efforts can only go so far, when so little is being done to deal with the big players. When GRAIN asked Muladno why the government was doing so little to stop bird flu in the big poultry operations, he was blunt. The Indonesian government is "powerless" to deal with these corporations, he said.

In Vietnam also, small farmers and poultry biodiversity are on the chopping block. Here too, small poultry farmers are affected by bird flu coming out of the larger operations. Hoang Hai Hoa, an officer with Agronomes & Vétérinaires sans frontières (AVSF) in Hanoi, says that the main source of outbreaks among smallholders in remote areas is from the import of layer chicks from large operations – one of the reasons why AVSF is supporting local chick production. Overall, however, there is little government support to help small-scale poultry producers to deal with bird flu. In fact, most government interventions obstruct or even prevent small-scale production.

In Ha Tay province, for instance, the government now requires poultry production to take place on land it is setting aside away from residential areas. Any farmer relocating to these areas must raise production to more than 200 birds. Since most small-scale poultry producers cannot afford to move to these locations, they are simply abandoning poultry.

Business is booming, though, for the big poultry companies in the province, which is the main source of poultry meat supplied to Hanoi. As small-scale production disappears, contract production is on the rise. Currently there are 500 households in the province with farms of 4,000–10,000 birds, and 250 of them do contract production for CP. It is sadly ironic that CP should benefit from this situation when the initial bird flu outbreak in the province originated on a CP farm. Mr Binh, Director of the Sub-Department of Animal Health, Ha Tay Province, told GRAIN that 117,000 chicks were infected at this CP farm, which supplies chicks for the whole nation. From there, bird flu spread rapidly throughout the country.

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An important factor restraining an agreement is a lack of desire in the North to change the status quo. A cynical refrain among EU delegates in late 2008 was "We need their virus, they need our vaccine, and nobody needs this framework." This feeling is certainly influenced by industry, which is strongest in Europe and has vastly outnumbered NGOs at the negotiating sessions. Industry has little desire to see the GISN changed either. Also intruding on the negotiations are industry concerns, seldom articulated, that agreement to benefit sharing for influenza virus could lead to pressure for concessions in other infectious diseases.

In the meantime, the WHO GISN continues to operate, but Indonesia and several other countries have limited their sharing of H5N1 viruses with it. Nevertheless, a distinct danger exists that, if developing countries are not sufficiently united and do not insist upon benefit-sharing specifics, the new WHO Framework could mandate virus sharing without a commensurate mandate for companies to share benefits.

Turning the GISN into a more equitable system will require limiting patent claims. Developing countries, including the Africa Group, Thailand, Brazil, Indonesia, and others, have proposed that there should be no intellectual property over GISN materials and products that incorporate them.[17] The degree to which they are successful remains to be seen.

Stopping patents, however, solves only one part of the problem. Flu vaccine production capacity is presently inadequate to supply the North, much less the South, in the event of a pandemic. And because production capacity is centred in the North, the South is at the end of queue to receive vaccine, meaning that it is likely to suffer disproportionate damage in a pandemic. To put it bluntly: Southerners will die, while Northerners will be vaccinated.

To solve this problem, some developing countries are seeking to link use of GISN virus with technology transfer. Under this proposed system, when industry commercialises a vaccine made from GISN materials in the North, it would incur obligations to make its vaccine technology available in the South, by granting licenses, providing know-how, and making mandatory contributions to a fund designed to ensure that such transfers actually happen.

Uncertainty currently abounds. Nobody can be sure of the timing and severity of a future pandemic, or even whether the H5N1 type of flu will prove to be the culprit. Preventing monopolisation of vaccine technologies and public health resources, however, will reduce the impact of future outbreaks. Indonesia's stand has alerted many governments to inequities and the need to reform WHO's virus collection system. But corporate and developed-country pressure for the status quo (or something closely resembling it) is strong. The outcome of the conflict is yet to be determined; but it can be hoped that the resulting system will improve public health by limiting corporate control and placing greater public health resources in the hands of developing countries.

17 See, for example, the Africa Region proposal published as an "annex" to WHO document A/PIP/IGM/7. http://tinyurl.com/d62lfp

GOING FURTHER

Edward Hammond, Some Intellectual Property Issues Related to H5N1 Viruses, Research, and Vaccines, September 2008, available online.
http://www.twnside.org.sg/title2/avian.flu/papers/patent.paper.pdf

Third World Network's collection of South–North Development Monitor (SUNS) articles on WHO pandemic influenza negotiations.
http://www.twnside.org.sg/avian.flu_news.htm

World Health Organisation home page for the Pandemic Influenza Preparedness Intergovernmental Meeting.
http://www.who.int/gb/pip/

Immunocompetent. Blog providing occasional news and comment on WHO negotiations.
http://immunocompetent.com

GRAIN, "Germ warfare - Livestock disease, public health and the military–industrial complex", Seedling, January 2008
http://www.grain.org/seedling/?id=533

GRAIN, "Viral times - The politics of emerging global animal diseases", Seedling, January 2008
http://www.grain.org/seedling/?id=532

GRAIN, web page providing details of GRAIN publications, external documents and other resources on bird flu and its impact on small-scale farmers.
http://www.grain.org/birdflu

GRAIN's latest publications

- ***The soils of war***

GRAIN, March 2009
http://www.grain.org/briefings/?id=217

In this Briefing, we look at how the US's agricultural reconstruction work in Afghanistan and Iraq not only gives easy entry to US agribusiness and pushes neoliberal policies – something that has always been a primary function of US development assistance – but is also an intrinsic part of the US military campaign in these countries and the surrounding regions.

- ***Nerica – another trap for small farmers in Africa***

GRAIN, January 2009
http://www.grain.org/briefings/?id=215

Nerica rice varieties, a cross between African and Asian rice, are being hailed as a "miracle crop" that can bring Africa its long-promised green revolution in rice. But outside the laboratories, Nerica is not living up to the hype. Perhaps the most serious concern with Nerica is that it is being promoted within a larger drive to expand agribusiness in Africa, which threatens to wipe out the real basis for African food sovereignty: Africa's small farmers and their local seed systems.

- ***Rice land grabs undermine food sovereignty in Africa***

GRAIN, January 2009
http://www.grain.org/articles/?id=46

In the wake of the 2008 global food crisis, African capitals have been buzzing with renewed talk of the need for food self-sufficiency, and rice is often at the top of government agendas. The solutions coming out of the corridors of power boil down to the tired old formula of getting more fertilisers and "high-yielding" seeds to farmers. The traditional knowledge and seeds of African farmers are completely ignored.

- ***Seized: The 2008 land grab for food and financial security***

GRAIN, October 2008
http://www.grain.org/briefings/?id=212

Today's food and financial crises have, in tandem, triggered a new global land grab. Fertile agricultural lands are becoming increasingly privatised and concentrated. If left unchecked, this global land grab could spell the end of small scale farming, and rural livelihoods, in numerous places around the world.

- **A farm land grab blog**

http://farmlandgrab.blogspot.com/

GRAIN is contributing to a blog on the farm land grab, where the latest news is posted. The blog is updated most days.

- **Hybrid rice blog**

http://www.grain.org/hybridrice/?blog

GRAIN also keeps a blog on the latest developments in hybrid rice

Government moves against Acción Ecológica

At the beginning of March 2009, the Ecuadorian government cancelled the legal permit of the well-known non-governmental organisation, Acción Ecológica. The move came as a great shock to Acción Ecológica and to its many friends and supporters within Ecuador and abroad. After a wave of protests, the Ecuadorean government decided on 22 March to suspend for two months the cancellation of the permit, to give time for Acción Ecológica's appeal to be heard.

Acción Ecológica, which has existed for 20 years, has become one of Latin America's most powerful environmental organisations. For six years it carried out painstaking research into the impact on the populations living along the Colombian–Ecuadorean frontier of the Colombia government's aerial spraying of glyphosate as part of US-funded Plan Colombia. The Ecuadorean government has used the evidence gathered by Acción Ecológica in its international judicial proceedings against the Colombian government. For two decades Acción Ecológica has also been monitoring the severe ecological damage that multinational oil companies, such as Texaco, have been causing to the delicate Amazonian ecosystem.

In its clarification of its unexpected move against the NGO, the Ecuadorian government, which is headed by the allegedly progressive President Rafael Correa, said that Acción Ecológica might be allowed to reopen if it sought registration within the ministry of the environment. When Acción Ecológica was founded in April 1989, Ecuador did not have a ministry of the environment, so the NGO registered with the health ministry. The health ministry has never made any complaint of any kind about Acción Ecológica's activities.

However, there are grounds to believe that the Ecuadorean government is seeking more than a mere bureaucratic reorganisation. In 2007 President Correa issued a decree that gave him to power to close an NGO, if he believed it was not serving "the public interest". This authority, however, applies only to NGOs created after the decree was issued. By forcing Acción Ecológica to re-register, the President will immediately be in a much stronger position to control its activities. It is also widely feared that the government will move against other NGOs after it has dealt with Acción Ecológica.

It is widely known that President Correa has been greatly irritated in recent months by the campaigning work done by Acción Ecológica and other organisations to alert the country to the dangers of the new mining law; this opens Ecuador to large-scale mining, which will greatly strengthen the power of mining multinationals within the country.

GRAIN has long worked closely with Acción Ecológica. Acción Ecológica forms part of the editorial council that produces *Seedling*'s sister Spanish-language publication, *Biodiversidad*.