

| | |
|--|-----------|
| THE IU: TIME TO DRAW THE LINE ON IPRS | 2 |
| <i>In the final negotiations on the International Undertaking on Plant Genetic Resources for Food and Agriculture, all parties must face up to the key issues blocking progress: intellectual property rights and benefit sharing.</i> | |
| THE DISAGREEMENT ON AGRICULTURE | 5 |
| <i>The World Trade Organisation's agriculture agreement is coming up for its first renegotiation. Now is the time to turn the talks on their head and draw up new rules that emphasise food security and sustainability.</i> | |
| KEEPING THE SUGAR BARONS SWEET | 16 |
| <i>Genetically-modified sweeteners have not significantly impacted the sweetener market as yet. The highly protected nature of the cane and beet markets means that sugar remains king. The question is, for how long?</i> | |
| INITIATIVES & ACTION | 26 |
| RESOURCES & DOCUMENTATION | 30 |
| SPROUTING UP: | |
| ⌘ GRAINS OF DELUSION: GOLDEN RICE | 24 |
| ⌘ HUMBLED BY THE GENOME | 28 |



THE IU: TIME TO DRAW THE LINE ON IPRS

GRAIN

Negotiations on the International Undertaking (IU) on Plant Genetic Resources for Food and Agriculture have reached a critical point. Without dramatic progress on key issues at the upcoming meeting in April, the Undertaking is likely to disappear from view once and for all. At stake is the world's access to a central component of biodiversity: the food that feeds us. In the final rounds of the negotiations, all parties must face up to the real issues that have been blocking progress for so many years: intellectual property rights and benefit sharing.

In the June 2000 issue of *Seedling*, GRAIN published an article on the renegotiation of the International Undertaking (IU) on Plant Genetic Resources for Food and Agriculture. The IU is a 20-year old voluntary agreement, implemented through the UN's Food and Agriculture Organisation (FAO), that aims to rewrite the rules of the North-South game with respect to the conservation, exchange, and benefits from the world's crop germplasm.

For too long the South's agricultural biodiversity has been flowing freely into the hands of the North, which then exploits it and patents it with no returns to the South. Several years ago, the IU was opened up for renegotiation in order to turn it into a legally-binding instrument and bring it in line with the Convention on Biological Diversity (CBD).

In the article "*Last chance for an open access regime?*" GRAIN argued that governments must take these negotiations much more seriously, because the world's crop gene pool is fast being privatised by corporations in countries that allow for monopoly rights on life forms. Such monopoly rights include patents and plant variety protection. Since then, a Contact Group of government representatives that carry out these negotiations has met three times: in August 2000 in Teheran (Iran), in

November 2000 in Neuchâtel (Switzerland), and in February 2001 in Rome (Italy). The meeting in Teheran made a good deal of progress on different fronts – which fired people with enthusiasm – but the one in Neuchâtel almost caused a total breakdown of the talks over the controversial issues of sharing of the benefits from crop genetic resources and whether to allow property rights over them. The most recent meeting in Rome did move the process forward – albeit in slow motion – but it did so by avoiding a lot of the contentious issues.

The next meeting of the Contact Group is now set for late April in Spoleto (Italy). Most observers now concur that unless agreement on a number of core issues is reached there, the negotiations will grind to a halt. This will mean that the chance to set up a multilateral system for that part of the world's biodiversity that feeds us – the genes in crops and other food plants – will vanish. But if countries do come to some common understanding during that session, then the expectations are that a new Undertaking could be agreed upon before the year is over.

The central aim of the negotiations is to establish a multilateral system in which as many countries as possible agree to common rules on conservation, exchange and benefit sharing in relation to crop genetic resources. The most



important and controversial question on the table is whether and to what extent the international community should allow intellectual property rights (IPRs) on the crop genetic resources included in the system. To many observers, the answer seems obvious. If the main objective of the Undertaking is to enable the free flow of crop germplasm – which all parties agree is central for any agricultural development and crop improvement efforts – then a clear ban on IPRs should not even be questioned. The very nature of IPRs, which are exclusive commercial monopoly rights, limits access to genetic resources when they are applied to life forms.

But inevitably, pressures from various quarters make the equation more complicated. Industrialised countries are keen to keep patent options wide open, for the benefit of their biotech and breeding corporations. Their message to the South basically boils down to: *“Please don’t limit our access to your rich biodiversity for the benefit of humanity. But we reserve the right to patent and monopolise it whenever an interesting commercial application appears in our labs.”*

The other hot issue is the question of how to share the benefits generated through the commercial use of the materials covered by the IU. An agreement was reached in principle last year that holders of patents on “new” crop varieties and other plant material developed as a result of facilitated access to the system’s germplasm should pay back some “*equitable royalty*” to the international community. This proposal actually came from the industry association ASSINSEL (International Association of Plant Breeders). On the surface, it might seem like a fair thing to do: to ensure that part of the profits that the North makes on the South’s germplasm flow back to the South. But there is a lethal trap built into this scheme. Money will only come out of it if all countries

accept the principle of IPRs on life. The more patenting, industry says, the more financial benefit. The countries that are echoing this position in the IU negotiations are actually advocating a strategy that will reduce access to biodiversity for everybody. This defeats the very objective of the IU. What is often forgotten in the FAO talks is that by allowing – promoting, in fact – the patenting of crop germplasm covered by the IU, a steadily increasing flow of valuable material will actually leave the multilateral system to become the private intellectual property of a few powerful corporations. This is the very gene-drain from the public to the private sectors that the IU negotiations are meant to reverse.

No IPRs has to be the bottom line. Clear boundaries must be drawn to ensure that intellectual property rights cannot be exercised on the genetic resources covered by the IU. Resolution of this issue lays the cornerstone which the remainder of the negotiations rest upon. The key is the Undertaking’s Article 13, which regulates access to the genetic materials covered by the system. Governments are contemplating three possibilities for this article:

(1) There should be no intellectual property or other restrictive rights on the plant genetic resources in the form received from the Multilateral System.

This is the language a number of industrialised countries are pushing, but is generally recognised as a non-starter, empty of any substance. Any material received from the system could not be protected as such by IPRs anyway – since the material would not be new – so this wording would not restrict IPRs at all.

(2) There should be no intellectual property or other restrictive rights on the materials in the form received from the Multilateral System or on their parts and components.



This adds some substance. It extends the proposed limitation on IPRs beyond the materials as such to their genes, cells, tissues, etc. However, it still retains the “*in the form received*” qualifier. Under this construction, if breeders develop new materials from the germplasm received, it would arbitrarily be left to each country to permit IPRs on that material or not, depending on national legislation. This leaves a lot of loopholes, especially as patent offices in some industrialised countries regard the mere act of isolating and purifying a gene as the production of “*new*” material. It also raises the question of how to ensure that such IPR-protected “*new*” material remains part of the IU and bound to the facilitated access rules.

(3) There should be no intellectual property or other restrictive rights on the materials received from the Multilateral System, or on their parts and components.

The difference here from the previous option is that the qualifier “*in the form received*” is deleted. In this scenario, any of the germplasm or its parts is clearly marked “*hands off!*” with respect to IPRs. This is the most reasonable and clear cut construction, because it means that breeding of basic food crops can continue freely throughout the world, with no threats, blockages, extra costs or legal headaches generated by lawyers. It would not ban all plant patenting, as the IU will only cover a limited number of crops. But it would effectively establish an IPR-free zone for the most important food crops.

Governments have to agree on some construction within this span of principles ranging from “*all IPR*” to “*no IPR*” as soon as possible. It is common knowledge that IPRs restrict access to genetic resources and undermine the central role of public institutions and local farmers in crop improvement. If they are allowed to be exercised with no restriction on the multilateral pool of germplasm, then the IU

has little to contribute – and probably no real reason to exist. If, on the other hand, the negotiators have the wisdom and courage to look beyond the short-term interests of a few, agree on a multilateral system that is free from monopoly rights and which promotes the conservation and improvement of crop germplasm by all actors, then they will create a valuable instrument for food security at all levels, now and in the future.

The importance of the successful conclusion of the IU renegotiation cannot be underestimated. Likewise, the urgency of pressuring governments into the best deal for agriculture and plant breeding worldwide (all plant breeding by all actors, not only genetic engineering by a few companies) cannot be exaggerated. At stake is the world’s access to a central component of biodiversity: the part that feeds us. ☞

For more information:

- GRAIN (2000), “Last chance for an open access regime?,” *Seedling*, June 2000. <<http://www.grain.org/publications/jun00/jun001.htm>>
- RAFI (2001), “The Other BioSafety Protocol,” *GenoTypes*, 20 February 2001. RAFI regularly follows the IU negotiations and produces briefing materials that can be found on their website at <<http://www.rafi.org/>>
- The International Institute for Sustainable Development reports in journalistic fashion from the scene of the IU negotiating sessions. <<http://www.iisd.ca/biodiv/iu.html>>
- The UK Agricultural Biodiversity Coalition is also actively involved in making press and campaign materials about the IU negotiations available on its website. <<http://www.ukabc.org/iu2.htm>>
- Official papers from the negotiations are available from the website of the FAO Commission on Plant Genetic Resources for Food and Agriculture. <<http://www.fao.org/ag/cgrfa/IU.htm>>



THE DISAGREEMENT ON AGRICULTURE

PETER EINARSSON

The World Trade Organisation's (WTO) agriculture agreement is coming up for its first renegotiation. Whether or not the 'new round' of the WTO becomes reality, members have committed themselves to revisit the agriculture rules. In an article based on a longer study, Peter Einarsson gives an overview of the agreement and reviews the options available to governments. His conclusion, based on work by a number of NGOs, is that if governments really want to make progress, they must dare to question the absolute priority of the trade liberalisation agenda. More important agricultural policy objectives like food security and sustainability must be put first, and trade rules made subject to them, not the other way around.

Like all the WTO treaties, the Agreement on Agriculture (AoA) is based on the firm ideological conviction that trade liberalisation will always bring net benefits to all participants. By removing barriers to trade, regional specialisation will increase. All over the world, regions will specialise in whatever their agriculture can produce more cheaply than others. When they exchange their products, everybody gains because the combined cost of production is less than if each region had produced its own.

In practical terms, this means promoting exports. The basic idea of the AoA is to create the conditions for agricultural exporters to increase their exports, and to limit the right of countries to follow a policy of food self-sufficiency. This makes sense in the simplistic world of trade liberalisation ideology. If more trade is always in everybody's interest, any impediment to exports blocks the realisation of those benefits and thus harms us all.

In the real world however, cutting the cost of food production is usually not the most important policy objective for agriculture. In most developing countries, basic food security is still the first priority. Providing enough food

for all is the issue, not whether local food production can fully compare in economic efficiency with producers elsewhere in the world. Experience indicates that unless there is a stable basis of local food production, food security is very difficult to achieve in a developing country. While international trade can certainly contribute, especially when local harvests fail or even more where there are constant deficits, the notion that it does not matter whether food is produced locally or not lacks credibility. To achieve food security, what most developing countries need are better means to protect and promote their own food supply, not further liberalisation of food trade.

Another first priority objective, equally important to developed and developing countries, should be to return agricultural production to ecological sustainability. Sustainable agriculture involves two core requirements: to preserve the productive capacity of natural systems, and to minimise the use of non-renewable resources. Both requirements are routinely disregarded by almost all agriculture today, and neither is really possible to fulfil unless food production and consumption are kept physically very close to each other. To maintain sufficient production without current



leves of chemical inputs and energy use, agriculture must be tailored to optimise use of locally available resources for local needs. In particular, crop diversity and high levels of plant nutrient and organic matter recirculation are essential. In practice, this means that ecologically sustainable agriculture is impossible to reconcile with the far-reaching regional specialisation that is fundamental to trade liberalisation.

Fundamental contradiction

Now, the good news is that WTO member countries are increasingly aware of the fundamental contradiction between the free trade agenda and other agricultural policy objectives. In fact, these so-called “*non-trade concerns*” have been a major focus of agriculture talks at the WTO since well before the Seattle ministerial meeting in December 1999, when they hit the spotlight. Both developed and developing countries are demanding the right to various exemptions from free trade disciplines to achieve other objectives. While ecological sustainability has not figured very prominently yet, food security certainly has. Developing countries also strongly emphasise their need to protect domestic agriculture because of its role as an engine of general economic development. Developed countries highlight the importance of preserving rural landscapes and cultures that are no longer economically competitive in their own right.

The bad news is that few if any countries have yet realised that they must make a choice. Judging from the confusing language coming out of the WTO negotiations, officials still seem to believe that all those non-trade demands can miraculously be fulfilled while at the same time continuing further down the road of general trade liberalisation. They are simply not being realistic. In essence, what countries are saying is that they want to keep the right to protect their

own agriculture, while being able to export without any restrictions to everybody else.

Before they wake up and start admitting that something has to give, not much progress should be expected. Once they do, however, there is no lack of realistic alternatives which both give reasonable conditions for trade and preserve freedom of choice in domestic agricultural policy. Toward the end of this article, a few options are presented which are essentially synthesised from the work of a number of development and environment NGOs over the last few years. But first a rapid overview of the context and content of the AoA.

Trade patterns

The first thing that has to be clarified about global trade in agricultural products is that it is much more limited than generally believed. Most people everywhere in the world still obtain their basic foodstuffs from relatively close to where they live. Of the staple foods, it is only in wheat that global trade is consistently above 10% of total world production. Only in a few of the typical plantation crops does global trade represent more than 50% of world production.

For almost all major food products, the volumes handled on the largest domestic markets are far more important than those on the so-called ‘world market’. Even in the most heavily traded staple food, wheat, the EU domestic market is roughly the same size as the whole of world trade. In beef, the US market is more than twice the size of world trade (see table opposite).

Agricultural trade is by and large an affair between developed countries. They have roughly a 70% share of both exports and imports. Exports from developing countries are mainly in tropical plantation crops. Only a handful of developing countries have export grains or animal products of any importance.



They are Thailand (rice and poultry), Vietnam (rice), Argentina (wheat, feed grains, soybeans, beef and milk powder), Brazil (soybeans, beef and poultry) and Uruguay (beef).

Many developing countries are buyers of grain, in particular for human consumption. Over 80% of the global trade in rice and wheat is imported by developing countries, as is a sizeable portion of feed grain and soybean exports. In contrast, few developing countries import animal products. The one exception is powdered milk, a low-value surplus product, of which 85 % of world trade goes to the South. All the high-value animal products such as beef, pork, poultry and cheese are traded either between developed countries or from South to North.

The main groupings

But describing world food trade patterns in terms of developed and developing countries is actually not the best way of understanding these patterns. Differences within the two groups are much more important than likenesses. If we

Approx. share of world production of selected agricultural products traded across borders

| | |
|-------------|-----|
| Coffee | 80% |
| Tea | 40% |
| Cotton | 30% |
| Soybeans | 30% |
| Sugar | 30% |
| Bananas | 20% |
| Wheat | 17% |
| Feed grains | 11% |
| Rice | 6% |

Sources: USDA, FAO, World Bank

exclude the tropical plantation crops and look mainly at the food staples, exports are dominated by a very small group of countries which can be described as "natural exporters": the USA, Canada, Argentina, Uruguay, Brazil, Australia and New Zealand. What unites them is favourable climates and soils, sparse population and late colonisation. These three factors have created the preconditions for a large scale, relatively extensive agriculture, operating within physical, social, and economic structures established not much more than 100 years ago. The result is production costs far below those of European or Asian farmers, and a production potential far beyond their own needs.

The only major food exporter on the global scene, which does not fit this description, is the EU. Western Europe is one of the most densely populated areas in the world, and has limited capacity to feed more than its own population. Historically, the EU countries have been through recurring food shortages, most recently following the Second World War. The EU was a net food importer until the 1970s. Its present role as exporter is largely artificial, created by agricultural policies (see box over page). Key factors in enabling the EU to be a food exporter are a very high use of chemical inputs, plus huge imports of feedstuffs that nearly balance out its main exports of grains and animal products.

Of the remaining developed countries several are net importers (Japan, Korea, Switzerland, Norway). In the former Soviet Union and some Central and Eastern European countries there are large areas that historically were exporters, but no longer are. Developing countries can be divided into three rather distinct groups. A few are "natural exporters" that can compete with developed countries on the global markets for wheat, feedstuffs and animal products. But a few other developing countries with higher population density and more traditional agricultural structure are also consistent net



HOW THE EU BECAME AN AGRICULTURAL EXPORTER

The story of how the EU became a major agricultural exporter is an overlooked but very instructive example of the power of trade agreements to change the world.

When the EU introduced its Common Agricultural Policy (CAP) in the early 1960s, a deal was struck with the USA in the framework of the General Agreement on Trade and Tariffs (GATT) negotiations. The USA agreed to accept the new border protection mechanisms put in place by the EU for food, in return for a commitment by the EU to allow unlimited import of feedstuffs from the USA at zero tariff. The EU at this point was still a net importer both of food and feedstuffs, so the deal appeared risk-free.

No more than 15 years later, however, the EU was producing large surpluses of both grains and animal products. These surpluses were the result of the greatly increased imports of feedstuffs, mainly soybeans but also large volumes of maize gluten and other grain derivatives. At first imports originated only from the USA, but over time also from Brazil, Argentina, Thailand (tapioca) and other countries. These cheap high protein feedstuffs made it possible for animal producers to rapidly expand production. The other side of the coin was that the shift to imported feed closed a major outlet for EU grain production, and created a surplus in that sector as well.

Without the zero tariff for feedstuffs, the huge surpluses of the 1970s would never have been possible, and export dumping from the EU would never have become a major global problem. In addition, feedstuff imports were without doubt the decisive factor behind the industrialisation of animal production in the EU and its concentration to the vicinity of major ports. By extension, feed imports are the root cause behind a number of serious environmental problems in European agriculture, most of which are related to intensive animal production.

exporters, notably Thailand and Vietnam. A larger minority of the developing countries are net importers, directly dependent on the world market for their basic food supply. Many of these are also among the world's 48 poorest, the Least Developed Countries (LDCs). But the large majority of developing countries belong to a middle group that is more or less self-sufficient in food (+/- 10%). Although they may more often buy than sell food on the world market, they are not dependent on imports on a regular basis. Many of those can also balance a certain import of basic foodstuffs against an export of other agricultural products, typically tropical plantation crops.

The aims of the AoA

Regardless of their position in the trade patterns, almost all countries favour their own agriculture over imports to some degree. There are three main methods to do this:

- *Border protection against imported products* – the cheapest method, and consequently the most widespread
- *Internal support measures for domestic producers* – since these require government support, they are mainly used by developed countries. Most developing countries do have some support programmes, most often in education and technical advice



- *Export subsidies* – used exclusively by developed countries

The aim of the WTO Agreement on Agriculture (AoA) was to reduce the use of all three methods for favouring domestic production.

- Regarding *border protection* the AoA introduced a prohibition of all protection measures except fixed tariffs. Other measures (eg, variable import levies and import quotas) must be converted into fixed tariffs. This process is called tariffication. These tariffs must then be reduced by a certain percentage during the treaty period.
- The AoA requires all countries to allow a certain *minimum market access* for every agricultural product (5% for developed countries and 4% for developing countries). If a country is self-sufficient in a certain product and protects domestic production with a tariff, it must offer a reduced tariff for the quantity specified in the AoA, so that imports can enter. This mechanism is called tariff rate quotas (TRQ).
- The AoA also contains detailed rules for how *internal support* may be designed. The main principle, often referred to as ‘de-coupling’, is that support measures cannot be directly related to production volumes.
- For *export subsidies* there are similar reduction requirements as for tariffs.

Developing countries have been allowed a lower level of reduction requirements (two thirds of those for developed countries) and a longer implementation period (10 years instead of 6).

Effects of the AoA

Overall, the AoA has been considerably less effective than expected. But effectiveness has varied greatly both between its different components and between countries. The reductions of *border protection* have been quite

effective in developing countries, but not in developed countries, who have used a number of techniques to minimise their effect. The *minimum market access* requirements have been quite effective across the board. Although the mandated percentages are low, the total trade volumes involved are considerable.

The rules governing *internal support measures* have fundamentally changed agricultural policy in most developed countries, and particularly in the EU. The cornerstone of pre-AoA EU policy was variable import levies. These levies regulated in detail the volumes of imports entering the EU, to guarantee that domestic products were always sold first. The ‘McSharry reform’ of EU agricultural policy in 1992, carried out in preparation for AoA requirements, established an entirely new system reducing this border protection and compensating farmers instead by direct (de-coupled) payments.

On *export subsidies* the AoA has had very limited effect. The main reason is that the agreement only regulates direct subsidies, and most of the export dumping now takes place with indirect subsidies, as will be seen below.

In sum, it is clear that the AoA has primarily favoured agricultural exporters. The agreement in effect codifies a ‘right to export’ through the rules about minimum market access, which mean that a country no longer has the right to opt for full self-sufficiency as a strategy in any category of agricultural products. No matter what the reasons might be, as long as there is an exporter anywhere willing to sell at a lower price, the AoA is on the side of that exporter. This applies to developed and developing countries alike, and even when the lower price is made possible through export subsidies.

Conversely, the AoA in many ways has limited the possibilities to support the development of domestic production. Almost all remaining



WTO-legal support options require direct payments through the government budget. Obviously, this strikes hardest against developing countries, which have very limited means to offer such support. Developed countries in addition have the right to continue with several forms of support which are now illegal for any other countries to introduce.

In addition, the AoA has not led to the expected stabilisation and increase in world market prices. On the contrary, price levels have dropped to historically low levels during the last few years, and fluctuations have increased.

Key issue 1: Export dumping

The most obvious weakness of the present AoA is its failure to deal with export dumping in any meaningful way. Sabotaging a market by systematically selling below cost of production

is a very obvious trade distortion, and in principle there is very broad agreement that it should not be accepted. Yet in practice, the AoA has led to the expansion of new and more insidious forms of dumping.

The bulk of export dumping now occurs through the direct payments introduced on a large scale as a consequence of the AoA itself. In developed countries, the bulk of support to domestic producers is today in the form of “*green box*” and “*blue box*” payments (see box). Their effect is to artificially reduce the price level on their whole domestic markets. And because the AoA does not bother about whether the domestic market price covers the actual cost of production, it is perfectly WTO-legal to export at this artificially reduced price.

Strictly speaking, it is not the payments as such which cause the dumping. As long as the

THE AOA TRAFFIC LIGHT: RED, AMBER, GREEN ... AND BLUE?

The different colour boxes used in AoA discussions are based on the traffic light principle.

The *red box* contained those forms of support which were prohibited immediately on the entry into force of the agreement, for example variable import levies.

The *green box* contains support measures regarded as “*minimally trade distorting*” and allowed to continue without any reduction requirement. For example, support to agricultural research, rural development, and public stockholding for food security purposes.

The *amber box* contains forms of support which are in violation of general AoA principles and allowed only on an interim basis provided they are gradually reduced. The bulk of these measures are systems for market regulation through guaranteed prices and government intervention buying.

The *blue box* was an *ad hoc* addition in the final stage of the negotiation, and contains much of what should logically have been in the amber box. Blue box measures are also in violation of AoA principles, but not subject to reduction requirements, provided they are connected to a production-limiting scheme. The blue box was designed specifically to accommodate developed country direct payment schemes.



payments are made to producers selling on the domestic market only, there is no problem. What needs to be addressed is under what conditions, if any, those products should be allowed to leave the country of production.

Key issue 2: Market access

Increased market access is the very core of the free trade agenda, and as such it is routinely supported by almost all WTO member countries. In developing countries, the hope of earning desperately needed foreign exchange on developed country food markets is widespread. What is striking is how all countries appear to view market access exclusively from the exporter's perspective. In reality, for every item exported there is an item imported. Improved market access also means that many countries will experience a reduction in agricultural production because their own export efforts fail while others succeed in competing on their domestic market.

The majority of developing countries have reason to be cautious, since they are more often food importers than food exporters. It is also a fact that in agriculture, unlike in industrial goods, developed country products are often cheaper than developing country products. This is sometimes because of export subsidies, but in other cases simply because of large scale, mechanised production. The overall net effect of increasing minimum market access requirements and continuing general tariff reductions under a new AoA would likely be to facilitate increased developed country exports to developing countries, not the opposite.

In addition, the tropical products that are a large part of developing country exports are already relatively favoured in terms of market access. In sectors where they do not have production of their own, developed countries already keep relatively low tariffs. The effects of a further

liberalisation of market access would also be very different for different sectors of agriculture in a country. While export producers may gain and there would be an increase in foreign currency earnings for the country, producers of food for the domestic market could suffer from low-price imports. Again, this effect would tend to be stronger in developing countries, where the export sector is often quite disconnected from domestic food production, or even directly competes with it for resources such as land, water or labour.

As made clear by John Madeley's review of case studies from developing countries in the December 2000 issue of *Seedling* (Vol. 17, No. 4, p 13), there are many examples of how basic food production has suffered as a result of liberalised imports, and few if any where it has gained. Part of the problem is, as the example of the EU shows (see box on p 8), "*liberalised*" agricultural trade is never really liberalised and the playing field never becomes flat.

Key issue 3: Internal support

The internal support issue was the central axis of the whole agreement: to increase market access by forcing countries to support their agriculture, if at all, by way of their own government budgets instead of by tariffs and levies on imports.

There is a persistent myth that internal support has decreased with the AoA. On the contrary, it has increased greatly, and this was entirely by design. When border protection had to be reduced, the only way to continue supporting farmers was through various forms of direct payments with tax money. Needless to say, this is mostly done by developed countries, as developing countries simply do not have the funds. And just like for border protection systems, there are rules prohibiting countries which did not have internal support systems



when they entered the agreement to introduce them later. All on the assumption, of course, that all these systems were to be progressively reduced and finally eliminated.

In reality, there are few signs that developed countries are about to reduce internal support any time soon. The USA did start a radical reform in 1997, aiming to eliminate most support systems over 7 years. But in the second year of the process, falling prices forced the US government to introduce *ad hoc* compensation measures, and since then farm support has increased to well above the previous level. And they have had legitimate reasons to do so. In developed countries, most farmers need additional support over world market prices if they are to survive economically, let alone perform additional services such as environmental maintenance and rural development. This is true for the US, and even more for the EU. Although usually better off than self-sufficiency farmers in developing countries, very few are in a position to produce food at the dumping prices of the world market. The common picture of them as a global leisure class, profiting from enormous subsidies, is false and has been created by free market ideologists to further their own agenda.

But while internal support systems may well be defended from many “*non-trade*” angles, their present design as indirect forms of export dumping cannot. Developed as well as developing countries have strong arguments for demanding the right to pursue agricultural policies which protect domestic production. But what no country can ever legitimately claim is the right to interfere with other countries’ markets, which is what export dumping is about.

Possible solutions

Are there any realistic alternatives to the present AoA, which could address the concerns both of

developing and developed countries? Yes, absolutely. But not as long as trade liberalisation is to remain the unquestioned top priority objective of the agreement. There is simply no way to reconcile absolute primacy of the right to export with food security, ecological sustainability or the several other non-trade concerns which have to be balanced in any serious agricultural policy. As long as more trade is always the first priority, all other objectives become impossible to achieve.

From the discussions among NGOs over the last few years, two clear principles stand out as a possible new basis for global agricultural trade policy. First, an absolute and effective prohibition of all forms of export dumping. Second, a high degree of freedom to design national agricultural policies, including the right to opt for a self-reliance strategy.

Some argue that this can only be achieved by removing agriculture from the WTO agreement altogether. Others see such a change as equally or even more possible within the WTO framework. At any rate, it is probably the mental change from a framework of simplistic free trade rhetoric to a more complex and pragmatic context which is the main hurdle. And no matter which way the argument goes, a solution requires some mechanism on the scale of the WTO to negotiate and administer the agreement.

Eliminating export dumping

To eliminate dumping in the broad sense of the word, ie all practices which involve exporting at a price below domestic cost of production, at least the following measures are necessary:

- *Prohibit direct export subsidies.*

This is a relatively straightforward operation, as direct subsidies are quite transparent, and because the EU is now the only large scale user.



- *Allow exports from supported markets only if the monetary equivalent of all support is added to the export price.*

Indirect export subsidies in the form of green and blue box support are now the main mechanism of dumping, and are much more difficult to discipline. Short of totally banning all exports from supported markets, the most workable system would probably be to require the imposition of an "export tax" equivalent to the combined value of all support granted to the product in question. The effect would simply be that the government requires its support money back for any product which leaves the country.

- *Discipline export monopolies and oligopolies, both public and private.*

Much of global agricultural trade is controlled by public or private monopolies and oligopolies. In particular transnational corporations, typically present in a large number of countries world-wide, play a central role in controlling price levels. As a minimum, there have to be transparency requirements which allow monitoring of compliance with dumping rules.

Freedom of choice in agricultural policy

In order to enable countries to develop freely their national agricultural policies (including the right to opt for self-reliance), the international trade rules need to be rewritten. As a minimum, the following measures need to be enforced:

- *Remove minimum access requirements.*

The requirements for minimum market access serve only one purpose, to force open new markets to exporters. They amount to a direct prohibition against food self-sufficiency.

- *Allow all types and levels of internal support.*

If exports from supported markets are regulated as proposed above, there will no longer be any reason to limit forms or levels of internal support. There will be no effects on other countries' markets, so the design of internal support can be entirely left to national governments to decide.

- *Allow all types and levels of border protection.*

Compared to the direct payment schemes, border protection is a more transparent method of support, because its effect is directly on the price level of the protected market. Consumers in that market get more correct information about the real cost of production than when part of the bill is picked up by support measures paid via taxes. In addition, there would be much less insecurity and complication involved in establishing a correct export price if most support was in the form of border protection rather than direct payments.

Is this protectionism?

No doubt these policy proposals will immediately be denounced as protectionist by free trade fundamentalists. Measured against the extreme export focus of the present AoA, it may be understandable if they appear so. The basic idea is, however, that agricultural trade policy should provide space both for exports and for protection. An agricultural trade agreement along these lines would not stop trade, nor the continued development of free trade relations. What it would do is give countries what is being called "food sovereignty": a choice regarding to what extent and in what products they would participate in agricultural free trade.

The basis of trade is mutual economic benefit. Where countries judge that it exists, they will certainly want it. What these proposals would stop is the right of exporters to force their way into domestic agricultural markets against the



will of the respective governments. They amount to a prior informed consent requirement.

These policies would be much more effective than the present AoA in guaranteeing fairness in trade relations. The requirement that all internal support must be directly reflected in export prices should virtually eliminate all distorting effects on other markets, while the present AoA may in fact have increased them by stimulating the expansion of blue and green box support systems. There is also reason to believe that these proposals could achieve the increase in world market prices which the AoA so far has failed to deliver. By requiring exports from protected and supported markets to take place at their *real* price levels, the cost levels of those (large) markets would have more influence on world trade pricing than today.

To be realistic, looking at the demands countries are actually putting forward in Geneva, it is quite obvious that only the exclusive little club of 'natural exporters', seriously advocates complete trade liberalisation. To openly abandon the free trade principle amounts to little more than acceptance of the status quo. It is the free trade advocates who are, increasingly desperately, clinging to a pipe dream.

Additional measures

Although a renegotiation of agricultural trade rules along food sovereignty lines would address many of the food security concerns and proposals tabled by developing countries, various special and differential treatment measures need to also be included. The present AoA is extremely weak in special allowances, even in comparison to other WTO treaties. There are no exemptions for developing countries, only the extra implementation time.

In particular, what would need to be handled separately is the situation of the net food

importers. When the AoA was signed in Marrakesh in 1994, it was already accompanied by a decision to offer a food security guarantee in case rising world market prices further aggravated the situation of the net food importers. This has not been followed up in action, despite increasing difficulties faced by those countries. If the measures outlined here were introduced it is likely that world prices would increase (which the present AoA has failed to effect), and there would be a need for assistance, particularly for the LDCs.

Another area where developing countries can demand special treatment is in providing better opportunities for using agricultural exports to leverage general economic development. In addition to allowing zero tariff imports from LDCs, as reluctantly agreed very recently by the EU, various measures could be taken to favour imports from developing countries generally. While under the general terms of this proposal all countries would have the right to restrict imports, a differentiation in favour of developing countries could easily be achieved by, for example, offering them lower tariff rates,

Will this happen?

The realism of an alternative trade scenario can and should be questioned. In practical terms it is certainly no less realistic than the present agreement. If anything it is closer to the actual intent of the majority of countries. But whether or not it will happen is entirely a political issue. Whether anything will happen in the context of the new round of WTO negotiations is an open question. Yes, there is a mandate to renegotiate the AoA regardless of whether a new round of the WTO gets underway or not. But few seem to believe that anything of importance will be changed unless there is a broader round in which to make deals involving other fields of trade policy. And the likelihood of such a round starting within the next few years is low.



But there are also contributing factors outside the trade arena with a potential to permanently change the politics of food production and trade. For example, genetically modified crops and BSE (“mad cow” disease) have profoundly turned public opinion away from industrial farming, and peoples’ voices are influencing policy makers. In addition, the increasing self-confidence of developing countries in the WTO will likely mean that development issues will progressively attain more weight, making another agriculture deal modelled on the Uruguay Round (between the US and EU with the rest of the world as passive onlookers) much less probable. A retreat from the principle of the Single Undertaking (the take-it-or-leave-it principle applied to trade agreements for the first time with the Uruguay Round accords) is also starting to be taken seriously.

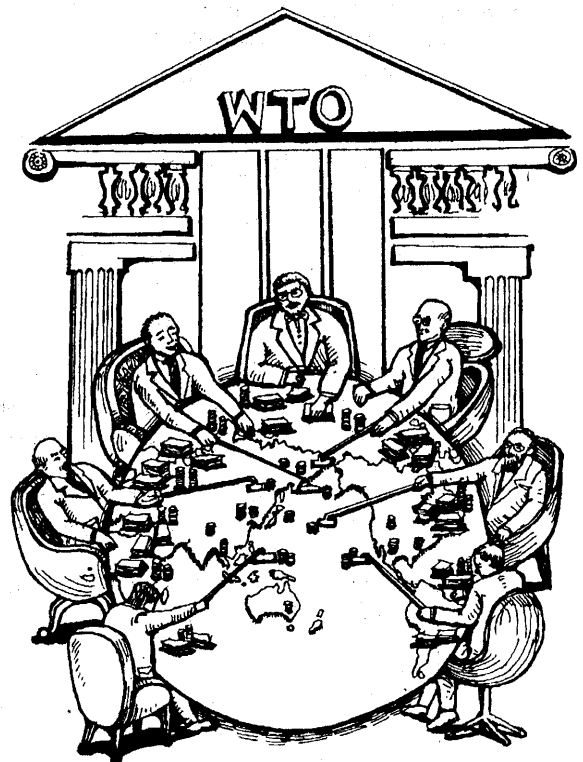
What could change the scene quite rapidly is if the EU decides to seek a partnership with the majority of developing countries rather than with the US. From several angles, the two groups have similar interests in agricultural policy. Neither are among the ‘natural exporters’, so they have no compelling reasons to pursue the ‘right to export’ policy. Instead, both have a clear interest in regaining more control over domestic policies, albeit for partly different reasons. The main grievance between them is export dumping, which could be resolved using the measures outlined here.☞

Peter Einarsson is an organic farmer, and a consultant to various development, environment and agriculture NGOs. This article is edited from a longer, fully referenced paper entitled “Agricultural trade policy as if food security and ecological sustainability mattered,” which was commissioned by Church of Sweden Aid, Forum Syd and the Swedish Society for Nature Conservation. The report is available from Forum Syd, Box 15407, 104 65 Stockholm, Sweden. Tel: (46-8) 506 370 00, Fax: (46-8)

506 370 99, email:< forum.syd@forumsyd.se>
It can also be downloaded from <http://www.wtowatch.org> where there are other related materials.

Recommended further reading

- D Van Der Steen *et al* (1999). *L’organisation Mondiale du Commerce et l’agriculture. La souveraineté alimentaire menacée par les accords commerciaux*. Novembre 1999. Collectif Stratégies Alimentaires, Bruxelles.
- A Kwa & W Bello (1998), *Guide to the Agreement on Agriculture. Technicalities and Trade Tricks Explained*. November 1998. Focus on the Global South, Bangkok.
- S Murphy, (1999), *Trade and Food Security. An Assessment of the Uruguay Round Agreement on Agriculture*. Catholic Institute for International Relations, London.



PAN Asia-Pacific



KEEPING THE SUGAR BARONS SWEET

ROBIN JENKINS

Ten years ago it appeared that biotechnology would have significant socio-economic implications in the sweetener sector. It looked as though sugar would be replaced by genetically-modified (GM), non-calorific, teeth-friendly alternatives. In fact, this shift has not come about – at least not yet. Robin Jenkins examines the reasons why sugar remains king in the sweetener sector and offers some insights into what the future holds for sweeteners, given the highly protected nature of the sugar market.

Sweetness is one of the primary senses of our taste buds. It is produced mainly by sucrose, which occurs naturally as a minor constituent of most fruits and vegetables. Refined sucrose, which produces the isolated sensation of pure sweetness, was introduced into the human food system mainly as a luxury item some 500 years ago, and it has only become a major source of energy in the human diet over the past 100 years. Global production has doubled in the last 50 years and is rising steadily, particularly in the South. World consumption of sucrose now amounts to an average of 21 kilos per person per year, and is rising steadily.

Sugar cane was originally the only source of refined sugar so the tropical and sub-tropical regions of the world where it grows once held a monopoly of supplies (see box opposite). Over the past 200 years this monopoly has been slowly reduced by competition from alternative sources of sucrose such as sugar beet (see box on p18), and, more recently, alternatives to sucrose, of which there are three types:

1. *Bulk calorific sweeteners*: such as isoglucose (corn syrup) and inulin.
2. *Synthetic super sweeteners*: chemically-synthesised and non-calorific, such as saccharine and aspartame.
3. *Plant super sweeteners*: plant-based and non-calorific, such as thaumatin and stevioside.

Cane sugar is now grown on more than 15 million hectares in more than 100 countries in the tropics and subtropics. It accounts for roughly two thirds of world sugar production. Sugar beet is now grown on some 10 million hectares in over 50 countries, almost entirely in the temperate regions of the Northern hemisphere. Isoglucose, which is 170% sweeter and 30% cheaper than cane sugar, is produced mainly in the United States (US), where it makes up 42% of the sweetener market. Although the soft drinks giants like Coca-Cola and Pepsi-Co replaced sucrose with isoglucose in the US some twenty years ago, they have not managed to do the same in the European Union (EU), where protectionist policies ensure that isoglucose is

Average production costs of sweeteners, expressed as \$ per ton of sugar sweetening equivalent

| | |
|--------------|-------|
| beet sugar | 703.6 |
| acesulfame-K | 576.1 |
| aspartame | 458.0 |
| cane sugar | 340.3 |
| isoglucose | 292.7 |
| saccharin | 13.9 |
| thaumatin | 1.2 |



A FAMILIAR TALE OF GENES GOING ASTRAY

Sugar cane is a perennial grass with no single genetic origin. The plant appears to have derived, either spontaneously or by human intervention from two wild plants - *Saccharum spontaneum* and *Saccharum robustum*. Various *S. spontaneum* varieties with 40-128 chromosomes have been found in Africa, India, South-East Asia and on some mid-Pacific islands. *S. robustum* varieties with 60 or 80 chromosomes (and on occasion up to 200 chromosomes) have been found throughout the Indonesian-Malaysian archipelago from Asia to Australia.

It seems that sugarcane was first used as a food in New Guinea. From here the cane was taken westwards to the mainland of Asia and eastwards to the isolated islands of the Pacific, with different consequences. In Asia, *S. officinarum* crossed with the naturally-occurring *S. spontaneum* to form *S. sinensis*, a relatively thin cane that formed the basis of sugar production in Asia and most of the rest of the world until the latter part of the 19th century. Meanwhile *S. officinarum*, known also as the "noble cane" because of its greater size, spread eastwards through the Pacific islands, where Europeans first encountered it during their voyages of discovery in the 18th century.

The two main varieties of cane remained geographically and genetically separate for at least two millennia until European breeders brought them together in the late 19th century. The modern sugar cane is a very different plant from the sugar cane of history. The 20th century breeding programme nearly defeated its own aims by relying on a very narrow breeding stock. In the 1970s, it was discovered that modern canes throughout the world were founded on no more than twenty *S. officinarum* and less than ten *S. spontaneum* varieties. Some thirty new *S. spontaneum* varieties have been incorporated into recent breeding programmes to broaden the genetic base of the crop, but the ways in which cane varieties cross are still not fully understood. Modern canes have between 100–125 chromosomes and derive almost entirely from a handful of breeding centres. Despite the fact that it is grown throughout the tropics, there is very little genetic variation from one continent to another.

allowed only a tiny niche market. Whilst the production costs of cane sugar and isoglucose are broadly comparable, beet sugar costs more than twice as much to produce (see table). It is therefore not surprising that beet production is protected, because a free market in sweeteners would be devastating to the beet industry.

Free world trade in sugar products would certainly wipe out beet production in Europe and could even wipe it out worldwide. Even when transport costs are taken into account, the

EU beet industry is still uneconomic. So why is there no panic in the EU beet sector? Why has no other country taken the EU sugar regime to the World Trade Organisation (WTO)? Why, in particular, is the US not campaigning on behalf of its biggest soft drinks manufacturers for an end to EU protectionism? And why are some of the biggest biotechnology companies investing so much in engineered beet?

Part of the reason lies in the fact that the EU is the worlds largest producer of sugar, the worlds



fourth largest importer of sugar and the world's second largest exporter of sugar. So much for the idea that trade is about profiting from comparative advantages in production. The EU is the most important single world player in sugar and sweeteners, even marginalising the influence of the US and Russia. When Brussels takes a decision about sugar or its substitutes, the effects are felt throughout the world, affecting the take-home pay of the poorest workers on the most exploitative sugar plantations in some of the world's poorest nations. It also affects the cost of a shopping trolley of food in the supermarkets of all of the world's richest nations apart from the US. The complexities and contradictions within the EU sugar regime affect practically the whole world.

Another factor keeping beet producers in business relates to the US production costs for beet and cane sugar. It costs almost twice as much to produce cane sugar in the US as it does anywhere else in the world, and even more than it costs to produce beet sugar in the US, which in turn is almost twice as costly to produce as isoglucose. Yet the rapid increase in isoglucose

use in the US from 1980 onwards has not stopped the domestic production of both cane and beet sugar from slowly increasing from 2.5 million tons of each in 1974 to 3.6 million tons of each in 1997. Per capita consumption of sugar in the US has also increased over the same period. The brunt of the US isoglucose revolution was actually taken by cane exporters to the US, not by American farmers. Philippine sugar exports to the US declined from 1.75 million tons in 1980 to 0.29 million tons in 1991 and it has stayed at this level ever since. In order to protect its domestic cane and beet production, the US simply dumped some of its developing country suppliers.

GM sweeteners: off to a slow start

Ten years ago it was thought that biotechnology would have significant socio-economic implications in the sweetener sector. It looked as though sugar would be replaced by genetically-modified (GM), non-calorific, teeth-friendly alternatives. In fact, this shift has not happened - at least not yet. There are three main reasons why this has not come about:

BEET'S UNLIKELY RISE TO STARDOM

Beetroot, mangold, chard and sugar beet all originated from the same plant, probably the wild seakale beet, which grows in the coastal regions of the Mediterranean. The Greeks and Romans both played a role in its domestication. Sugar beet resulted from the selection and breeding of fodder beet in the late 18th century. Beets producing 6% sugar had been developed by 1775 and that might have been the end of the story had it not been for the Napoleonic Wars. The British Navy cut off France from its Caribbean suppliers of cane sugar and Napoleon responded in 1811 by ordering a crash programme for breeding and growing beet. When the cane sugar trade to France was restored after 1815, France restricted imports in order to protect the domestic production of beet sugar. Other European states were quick to see the strategic military importance of having a domestic supply of sugar at a time when the British held a virtual monopoly of sea power. Similar policies for the protection of beet were swiftly adopted by other European nations. In effect, the current deeply protectionist EU sugar regime dates back in all its essentials to 1815. Equally, the continuing British reliance on cane sugar is a leftover from the era of its naval supremacy.



SUPER-SWEETENERS TEMPT THE PALATE

There are many new plant-based sweeteners in the pipeline, including thaumatin, monellin, hennamycin, stevioside, miraculin and brazzean. These are all natural “*super-sweeteners*,” so called because they are thousands of times sweeter than sucrose. The extraction of these sweeteners directly from the plants is expensive, so most research has gone into isolating the sweetness genes and engineering them into bacteria. Thaumatin, which is derived from the West African *katemfe* bush, is already on the market. The genetically engineered route for the production of thaumatin is far cheaper than harvesting it. But both Unilever and Tate & Lyle seem to be waiting to see what happens to the market for genetically modified foods before switching over to GM production.

Biotechnology companies have a choice between presenting their sweetener products alongside the chemical alternatives, thus risking association with all the carcinogenicity scares that regularly afflict this sector, or presenting their products the product of modern biotechnology. In the case of thaumatin, industry has opted for the former. It is clear that neither the chemists nor biotechnologists are yet able to deliver the “*dream sweetener*” that does everything consumers would want of it, but with no harmful health or environmental effects. The estimated cost of developing such a sweetener is so high that only a handful of multinational corporations could possibly do it. Even global giants like Johnson & Johnson and Tate & Lyle had to team up to finance the development of sucralose.

1. The protectionist politics of the biggest players in the sweetener sector (eg Tate & Lyle, Unilever) have severely limited the introduction of sucrose substitutes into the market.
2. The genetic engineering industry over-estimated its technical abilities at the start and has been technically unable to deliver designer sweeteners to the consumer-led food sector.
3. The genetic engineering industry has encountered heavy political opposition from consumers and environmentalists, especially to the introduction of GM foods.

Somewhat surprisingly, research and development of GM sweeteners remains a relatively low priority for the sugar giants. A decade ago it looked as though biotechnology was going to be the engine of innovation in the sweetener sector, but actually the chemists still dominate the field. In 1999, the applications

for sugar and sweetener patents accounted for 9% of the total in the agri-food sector. However, only 4% of these applications were for GM sweeteners whilst 70% were for the industrial production of alternative sweeteners. The remaining 26% covered innovations in agricultural production (16%) and refining (11%), mainly of sucrose and isoglucose.

There was an initial burst of research interest in GM sweeteners in the 1980s, during which the invention of a GM super-sweetener that could replace sucrose seemed to be the modern equivalent of the alchemist’s dream. Companies are taking their time to bring GM sweeteners to market (see box above). By the mid 1990s, the genetic engineering industry had turned its attention to sucrose, thinking that profits were more likely to be found in the protected sweetener sector. The industry has, furthermore,



ENGINEERING A FUTURE FOR SUGAR

The biotechnology of beet improvement is economically reliant upon the continuation of protectionist sugar policies. The fact that just about every major biotechnology company in the world is investing in beet biotechnology says something about the likelihood of reform. Most of the research has focused on resistance to the herbicides – glyphosate, glufosinate and sulphonylurea – but some work has also been done on resistance to frost and drought as well as to virus and fungus attacks. However, wary of the negative public reaction in Europe to genetically engineered food crops, the industry claims that it has no plans to use genetically engineered beet sugar in “*the foreseeable future*.” Beets that can synthesise other sugar polymers besides sucrose have been field-trialed but are far from commercialisation. Increasing the productivity of beet, thereby making its production more competitive, would seem to be an obvious goal for beet biotechnologists

One product is of particular interest to the food industry. Fructan genes can be engineered into beet, which is far cheaper than producing it from sucrose in bioreactors. Fructan tastes and feels like sugar, but contains zero calories. In theory, fructan-producing beet could escape the EU quota system on the grounds that it does not contain human-digestible calories. However, because it is not digestible it must seek market clearance under the legislation for food additives. Other “*non-food foods*” such as Olestra (a non-digestible fat) have had difficulty getting through the EU regulatory system in the past, though they have obtained marketing consent in the US.

Genetically engineered cane is still at a preliminary stage. The plant is a high polyploid with a large genome and numerous, varying numbers of chromosomes, making the mapping of its genome a highly complicated task. Even in conventional breeding programmes cane does not conform to normal genetic expectations. However, antibiotic- and herbicide-resistant markers have now been successfully inserted into cane, and glufosinate-resistant cane has been field trialed. Such innovations are of little commercial interest. Most weeds are smothered by cane and weed killers are actually not used against weeds in the cane fields but to kill off the residual leaves of the cane plant immediately prior to harvest, thus making harvesting easier.

Of potentially greater interest to cane farmers would be plants resistant to standard pests such as the sugarcane borer (*Diatraea saccharalis*), the sugarcane beetle (*Euethola humilis*), sugarcane mealybugs (*Saccharicoccus sacchari*, *Dysmicoccus boninsis*), and the sugarcane delphacid (*Perkinsiella saccharicida*). The engineering of insect-resistant plants currently relies almost exclusively on the use of *Bacillus thuringiensis*, but as insects become resistant, attention is likely to shift to another bacterium, *Photorhabdus luminescens*. Such ventures are fraught by insect resistance problems and normally result in the total loss of the poison as a biologically useful control. Even with annuals, such strategies only delay the onset of insect resistance. No one has devised a resistance management strategy for a perennial like cane.



focused on the most protected part of the sucrose sector, namely beet (see box opposite), partly because beet is an easier plant to engineer than cane. Key biotechnology companies such as Monsanto and Astra-Zeneca are clearly investing in GM sugar beet on the assumption that the WTO will never open up the protectionist preserve of beet sugar and expose it to world market conditions. There is a profound conflict of interest between capital invested in sugar beet and capital invested in any other source of sweetness. To date, the traditional sweetener industry based on sugar has been remarkably successful at seeing off the establishment of any competition.

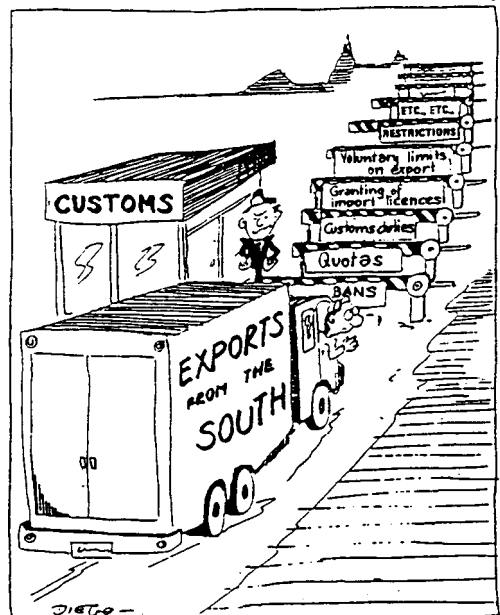
Genetic engineering is seen as the only hope of making beet production competitive with other sweeteners. The regulatory authorities in the US and the EU have been as helpful as possible to the sugar industry, by insisting that refined sugar is an inert chemical containing no genetic material so it does not need to be labelled if it comes from GM plants. This sits somewhat uncomfortably with the sugar industry's insistence that refined sugar is a "natural food," but might work as a strategy to keep consumers in the dark. But it could also backfire spectacularly. Consumers tend to get angry when they discover that they have been kept in the dark, and they can react with devastating economic effect simply by not putting certain items in their shopping trolleys.

Sucrose has more than maintained its market over the last two decades partly because the bulk and super-sweetener alternatives cannot substitute for sucrose in food processing at a time when more and more food worldwide is being consumed in processed form. However, with the increasing market penetration of products such as sucralose, which is 600 times sweeter than sucrose and suitable for use in many processed foods, it is not clear whether sucrose will continue to compete. The world's

most successful super-sweetener market is the US, with artificial sweeteners accounting for 17% of the market.

Conclusion

Our consuming passion for sweetness has a bitter history. Although sugar is no longer produced by slaves, a cane worker's lot has changed very little from those days. Most plantation workers still find it difficult, if not impossible, to feed their families on the wages they get. Many face persecution and oppression for demanding anything better. The sugar market bears exploitation as its trademark. While GM sweeteners have not yet made any serious impact on the sugar market, it may only be a matter of time before they do. In some ways, the loss of export markets to alternative sweeteners might even be a blessing in disguise for many Southern countries, if their poisoned plantations could be transformed into productive farmlands for the local economy. But GM sweeteners come armed with their own array



The EU and US's protected markets make it hard for Southern sugar exports to break through

IRED-forum



PATENTS AND PIRATES PREDICT THE FUTURE

Going down the GM route offers companies the advantage of turning sweetener production into an industrial process that is no longer dependent on raw materials from the South and which can be protected from competition by patenting. Whilst some of the new raw materials for the manufacture of GM sweeteners have been invented in the laboratory, most of them are straightforward discoveries which have been pirated from local peoples' gardens, along with the knowledge of how to grow and harvest them. Thaumatin and Brazzein have both been the subjects of such a fate. In theory it is only possible to patent an invention, not a discovery. But in practice the theft and privatisation of local peoples' knowledge by giant corporations, otherwise known as biopiracy, is now more or less institutionalised.

The direction taken by the search for the perfect sweetener will probably be determined more by patent laws than by technical questions or biological factors. Research is almost entirely devoted to the industrial synthesis of sweeteners rather than growing them in the field. Tate & Lyle did set up katemfe plantations in Ghana, Liberia and Malaysia in the 1970s and still processes the berries, which are frozen and flown to the UK for the rather expensive extraction of the thaumatin protein. However, it was Unilever that first extracted the genetic code for thaumatin and inserted it into the *E. coli* bacterium. There are currently three food multinationals, two biotechnology companies and three universities with patents or applications on thaumatin but there appears to be no further research on the katemfe plant as such. The plant is now little more than a source of thaumatin sweetness genes, and the local knowledge that led bioprospectors to the plant and how to process it is now enshrined in corporate patent applications.

The story of Brazzein provides a similar story. Brazzein is a protein 500 times sweeter than sugar derived from a West African berry. Unlike other non-sugar sweeteners, brazzein is a natural substance and does not lose its sweet taste when heated, making it particularly valuable to the food industry. It came to the attention of industry after a US researcher observed people and animals eating the berries in West Africa. Researchers at the University of Wisconsin have been granted US and European patents for a protein isolated from the berry of *Pentadiplandra brazzeana*, the genetic sequence coding for it and the transgenic organisms to which it has been added. Subsequent work has focused on making transgenic organisms that produce brazzein in the laboratory, thereby eliminating the need for it to be collected or grown commercially in West Africa.

Nektar Worldwide and ProdiGene, a spin-off of Pioneer Hi-Bred International, the world's largest seed company, have genetically engineered corn that produces large amounts of brazzein. They estimate that future demand will be met with one million tonnes of GM corn instead of any source from West Africa. This is a clear example of how the patent system completely disregards local knowledge and innovation of Southern peoples by permitting researchers to claim to have invented something they merely isolated and reproduced in a Northern laboratory.



of exploitative practices and injustices (see box opposite).

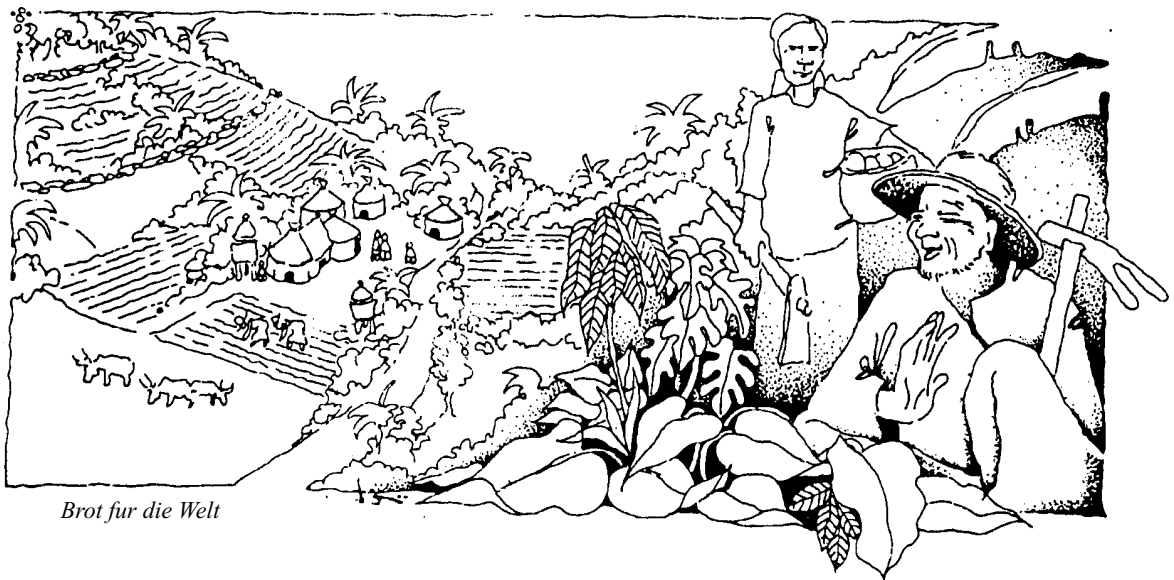
But there are some positive signs. It is now possible to buy organically grown cane and beet sugar that is less damaging to the environment. It is also possible to buy fair trade sugar that guarantees better livelihoods for cane workers. Now we need to demand organic fair trade sugar that is produced by environmentally and socially responsible methods - and insist that the food industry uses it in processed foods.☞

Robin Jenkins is an independent researcher and farmer. He can be contacted at La Ferme Paulianne, Luc-en-Diois, 26310, France. Email: Concentropie@wanadoo.fr

Main sources:

- H Hobbelink (1991), *Biotechnology and the Future of World Agriculture*, Zed, London.
- N Simmonds, ed. (1976), *Evolution of Crop Plants*, Longman, London.

- FAO, *Production Yearbooks 1980-2000*, Food & Agriculture Organisation of the UN, Rome.
- FAO, *Trade Yearbooks 1980-2000*, Food & Agriculture Organisation of the UN, Rome.
- ISO, *Sugar Year Books 1980-2000*, International Sugar Organisation, London.
- R Jenkins *et al* (1996), *Socio-Economic Implications of New Biotechnology in the EU Sweetener Sector*, DG XII, European Commission, Brussels.
- RAFI (1987-2000), *RAFI Communique*, Rural Advancement Fund International, Pittsborough, NC, USA.
- Landell Mills (1994). *World Survey of Sugar and HFCS*, Landell Mills Commodities Studies.
- USDA, *Sweetener Market Data, 1980-2000*, United States Department of Agriculture, Washington, USA
- Mintel (1991), *Sugar and Artificial Sweeteners*, Mintel Market Intelligence, London.
- ED & F. Mann, *European Union Sugar Statistics 1990-2000*, ED & F Mann Sugar Ltd, London.
- Various articles from the *International Sugar Journal*, 1995-2000.
- *Derwent Biotechnology Abstracts*, 1990-2000, Derwent Publications, London.





Sprouting Up: GRAINS OF DELUSION

Golden Rice has hit the headlines again. The biotechnology industry has been slammed from various corners over the latest vanguard in its campaign to win over the public to the promises of genetic engineering. Syngenta, the company holding most of the patents on Golden Rice, has been making itself an easy target.

Syngenta's Dr Adrian Dubock recently claimed that, *"The levels of expression of pro-vitamin A that the inventors were aiming at, and have achieved, are sufficient to provide the minimum level of pro-vitamin A to prevent the development of irreversible blindness affecting 500,000 children annually, and to significantly alleviate Vitamin A deficiency affecting 124,000,000 children in 26 countries."* He has also stated that each month Golden Rice's entrance to the market is delayed will result in 50,000 children going blind. However, a simple calculation based on recommended daily allowance (RDA) figures show an adult would have to eat at least 12 times the normal intake of 300g of rice to get the daily recommended amount of provitamin A from Golden Rice.

Greenpeace has been characterising the Golden Rice project as *"international deception."* In Canada, it has filed a complaint against television commercials claiming that *"Golden Rice could prevent blindness and infection in millions of children"* to the Advertising Standards Committee. *"This isn't about solving childhood blindness, it's about solving biotech's public relations problem,"* says Greenpeace's Martin Khoo. Even Ingo Potrykus, the Swiss scientist who developed Golden Rice and has historically adopted industry's position on vitamin A rice, is unimpressed with industry's hype. *"I share Greenpeace's disgrace about the heavy PR [public relations] campaign of some agbiotech companies using results from our experiments, which were exclusively done within public research institutions, and using exclusively public funding,"* Potrykus remarked at a recent meeting in France. But he still remains confident that they will be able to increase the provitamin A content of Golden Rice and argues that RDA figures are *"luxurious"* recommendations, rather than accurate indicators of the vitamin levels really needed by the body to function.

The Rockefeller Foundation, which has been very supportive of the development of Golden Rice and is funding work to transfer it to the South, has also acknowledged that *"the public relations uses of Golden Rice have gone too far."* In a letter to Greenpeace, Rockefeller head Gordon Conway states that *"we do not consider Golden Rice the solution to the vitamin A deficiency problem. Rather, it provides an excellent complement to fruits, vegetables and animal products in the diet, and to various fortified foods and vitamin supplements."*

This hoopla has all happened just when the first samples of this rice are arriving in India and the Philippines for further research and development. Under Indo-Swiss

(cont'd ..on next page)



collaboration (with Potrykus at the helm), Golden Rice technology is to be made available to the Indian Council for Agricultural Research (ICAR) and the Indian department of biotechnology. The project, funded to the tune of \$US 2.6 million over seven years, aims to engineer the provitamin A genes into local varieties of rice.

But what do local organisations and farmers really think about the whole idea of genetically engineered Vitamin A rice? A new report produced jointly by BIOTHA (Thailand), CEDAC (Cambodia), DRSC (India), MASIPAG (Philippines), PAN-Indonesia (Indonesia), UBINIG (Bangladesh) and GRAIN shows that, on the ground, people are not enthusiastic about this new technology. Indeed, “... *at the end of the day, the main agenda for golden rice is not malnutrition but garnering greater support and acceptance for genetic engineering ... Golden Rice is merely a marketing event.*” The report situates Golden Rice where it is intended to land: farmer’s fields in Asia.

The report first examines the promises: the benefits for the consumer and the farmer; the benefits of the public-private collaboration; and the benefits of the “free” license agreements. To make these promises has been easy, but even at this stage they reveal serious flaws. In reality, malnutrition stems from poverty, which Golden Rice cannot address. Furthermore, evidence shows that Golden Rice will have little effect on reducing vitamin A deficiency, providing at most 20% of an adult’s vitamin A requirements. In addition, one of the biggest problems with Golden Rice is the hidden agenda behind it. Significantly, the Philippine-based International Rice Research Institute (IRRI) has been called on to “*continue to campaign for genetic engineering as a legitimate breeders’ tool, using the ‘golden’ rice as a flagship*” by its technical advisors. With the arrival of Golden Rice in the Philippines in January 2001, IRRI is now set to fine-tune the rice for Asian conditions.

This report shows that local alternatives do exist. But will they survive the onslaught of genetic engineering?

“The best chance of success in fighting vitamin A deficiency and malnutrition is to better use the inexpensive and nutritious foods already available, and in diversifying food production systems in the fields and in the household. The euphoria created by the Green Revolution greatly stifled research to develop and promote these efforts, and the introduction of golden rice will further compromise them. The promoters of golden rice say that they do not want to deprive the poor of the right to choose and the potential to benefit from golden rice. But the poor, and especially poor farmers, have long been deprived of the right to choose their means of production and survival. Golden rice is not going to change that, and nor will any other corporately-pushed GE crop.”

“Grains of Delusion: Golden Rice seen from the ground” is available on GRAIN’s website: <<http://www.grain.org>> or from the GRAIN office (see p 28).



**INITIATIVES
&
ACTIONS**

No Aloha for the ADB !

The Asian Development Bank (ADB), a multilateral sister of the World Bank, is holding its Annual Meeting in Honolulu, Hawai'i from May 9-11. ADBwatch Hawai'i is inviting NGOs to "join in and create non-violent activities challenging globalisation and the ADB's record of imposing destructive and oppressive policies and projects on communities throughout Asia and the Pacific." NGO events will take place from May 5-11. The ADB Annual Meeting was originally scheduled for Seattle, but after the protests at the World Trade Organisation ministerial in Nov/December of 1999, the venue changed to Honolulu with the expectation of avoiding resistance and scrutiny. At last year's ADB Annual Meeting in Chiang Mai, Thailand, 5,000 Thai villagers protested for 3 days against water usage fees being imposed by the ADB.

To join the International Listserv, email: <adbwatch-international-subscribe@egroups.com>. **Web:** <<http://www.crosswinds.net/~hexis/ADB-Watch.html>> or write to: ADBwatch, UH-Hawai'i Manoa, 2465 Campus Road, RIO Box A-4, Honolulu, Hawai'i 96822. **Email:** <adbwatch@lava.net>

Join the international day of farmers struggle

Five years ago Via Campesina named April 17th the international day of farmers struggle, to mark the massacre of 19 Brazilian farmers. A day of action is planned "to protest GMOs and patents and actions in favour of farmer seeds," and "to protest dumping, the importation a cheap food that destroys food production and actions in favour of food sovereignty." To coordinate this day of action, Via Campesina has created an email group to exchange information.

To join, send a message to <viacam17april-subscribe@yahoo.com> Information will be circulated in English, Spanish or French and the list will be moderated.

For more information, contact: Via Campesina Sec. opérateur : Apdo Postal 3628 Tegucigalpa, Honduras, Tél/fax (504) 220 1218. E-mail : <viacam@gbm.hn>

Starbucks campaign launched in the US

After its success in exposing the StarLink scandal, a coalition of US NGOs is going on the offensive against Starbucks, the largest gourmet coffee shop chain in the world. The campaign, organised by the Organic Consumers Association, Friends of the Earth, Rights Action Canada, the Center for Food Safety, Pesticide Action Network, and Sustain (USA), will focus on genetic engineering, fair trade and social justice issues. On March 20, 2001, while Starbucks holds its annual shareholders meeting in Seattle, the coalition is organising "Frankenbucks" protests in front of Starbucks cafes in up to 100 cities across the US. Organisers predict this will be the largest co-ordinated protest against genetically engineered foods (as well as the largest protest against agricultural sweatshops) in US history. Twenty percent of all coffee shops in the US are now owned by Starbucks, and it has outlets in 18 nations, making it one of the fastest growing food and beverage companies in the world.

For more information, go to <<http://www.organicconsumers.org/Starbucks/>> To leaflet or do media work locally, contact Simon Harris: Tel (1-510) 525 7054, email: <simon@organicconsumers.org>. To organise a campaign outside the US, email <campaign@organicconsumers.org>



Mobilising against the FTAA

Mobilising opposition to the Free Trade Agreement of the Americas (FTAA) is proceeding rapidly. There will be a major educational effort during March and April, including caravans and speaking tours around North America. This will culminate in a big gathering in Quebec City on April 21-23 at the time of the conference, wherein the US and Canada will push for the agreement of all hemisphere states to a trade agreement modelled on the North American Free Trade Agreement. Sierra Club Canada would like to know who will be coming to Quebec for the FTAA events (protests, teach-ins, demonstrations, and other 'celebrations') and who would be interested in being on environmental and/or trade and/or related issue panels, presentations, and press conferences. Other NGOs mobilising against the FTAA are concerned about the lack of voices of women from South and Central America speaking on this proposed treaty. They are looking for input from women's groups, particularly from the South, who are organising against the FTAA or have taken a position on the proposed treaty.

If you're going to Quebec, please contact the Sierra Club's Lucy Sharratt by email at: <sierra@web.net>

For ideas on women's voices, please contact: Jean Grossholtz, 10 Jewett Lane, South Hadley, MA 01075, USA. Email: <jgrossho@mtholyoke.edu> Fax: (1- 413) 538 2082. Tel: (1-413) 538-2442.

Tell the US government what you think of it

The US government is offering the public the chance to comment on the environmental regulation of biotechnology. It has released six case studies of environmental regulation of biotechnology, as a way to review the adequacy of the US Coordinated Framework. The documents are available at the website of the Executive Office of the President via the Office of Science and Technology Policy (OSTP). Seven documents are available: Introduction

and Request for Public Comment; and six case studies on salmon, Bt-Maize, soybean, animals as pharmaceutical producers, bioremediation using trees, and bioremediation using bacteria. A May 1, 2001 deadline has been set for comments.

To comment, visit the OSTP website at <<http://www.ostp.gov>>. Press the "What's new" link and then under News releases, follow links for CEQ/OSTP study. You will arrive eventually at links to the 7 parts of the report.

Wanted: Online volunteers

Netaid.org, an online movement to fight global poverty, has launched a programme for people to do voluntary work for the United Nations Development Programme (UNDP) and hundreds of non-government agencies (online or offline) worldwide. Founded by Cisco Systems and UNDP, Netaid.org made its debut in cyberspace back in 1999 after hosting perhaps the biggest webcast (online broadcast) ever, featuring world-renowned music artists. Netcast's website hosts many opportunities for work that requires special skills such as writing, online editing and outreach work. The site also provides a description of the job, the hours expected to complete it, the skills needed and other related information. A common requirement is that you need to have access to a computer and the Internet.

To learn more, visit Netcast's website at <<http://www.netaid.org>>





Sprouting Up: HUMBLING BY THE GENOME'S MYSTERIES

These are exciting times for genomics research. At the end of January, Syngenta announced that, with Myriad Genetics, it had finished mapping the rice genome. Two weeks later, two rival teams – one from the public sector, one private – announced the completion of the human genome map. These events were accompanied by much hoopla from the agribiotech and pharmaceutical companies hoping to capitalise on the findings. According to Syngenta's David Evans, understanding the genetic structure of rice and other cereals will *"enable plant breeders to produce crops that are more nutritious, more productive and easier to process."* The genome unveilings have also been applauded by public sector research institutes, such as the International Rice Research Institute (IRRI). The mapping of the rice genome will *"make a very big difference to our work at IRRI, not only in areas such as biotechnology but also by greatly improving the efficiency of research,"* says IRRI's Director General.

But for many people, the findings of the human genome project have raised more questions than they answer, and call into question some ground rules of science that will require a complete reassessment of the way we look at genes and how they function. One of the most profound findings was that humans contain far fewer genes than we thought. The fruit fly *Drosophila* possesses 13,000 – 14,000 genes and the roundworm *C. elegans* (which contains just 959 cells) has just over 19,000 genes. The general estimate for humans – sufficiently large to account for the vastly greater complexity of humans under conventional views – was well over 100,000. But the human genome study only came up with something in the range of 30,000. This finding has thrown out of the window the *"central dogma"* of genetics, which assumes that one gene codes for one protein.

Things, it seems, are a little more involved than that. It appears that the key to complexity is not more genes, but more combinations and interactions generated by fewer units of code. The implications of this finding cascade across several realms. The commercial effects will be obvious, as so much biotechnology, including the rush to patent genes, has assumed the old view that 'fixing' an aberrant gene would cure a specific human ailment. Similarly, in agriculture, these findings will hopefully lead to more restraint on the 'slap-a-gene-in' approach to crop development. The social implications are that we may finally be liberated from the simplistic and harmful idea that each aspect of our being, either physical or behavioral, may be ascribed to the action of a particular gene.

It turns out that our 30,000 genes make up only about 1% of our total genome. The rest has (rather disrespectfully) been called *"junk DNA,"* because scientists couldn't figure out what it was for. *"We have to look beyond the genes,"* said Richard Gallagher of *Nature*, which published the findings of the public sector effort, known as the Human Genome Project. *"We know what they are. We don't know what the rest of the stuff is that is sometimes called 'junk.' It is that drawer you have at home that is stuffed with*



memorabilia. Some things are essential, like your passport and birth certificate: they are your genes. But there is other stuff that gives insight into who you are and where you came from and why you do the things that you do."

Perhaps the most interesting questions raised by the human genome map go well beyond the science of genetics. According to Harvard professor Stephen Jay Gould, *"the deepest ramifications will be scientific or philosophical in the largest sense. Since the late 17th century, science has strongly privileged the reductionist mode of thought that breaks overt complexity into constituent parts and then tries to explain the totality by the properties of these parts ... The reductionist method works triumphantly for simple systems - predicting eclipses or the motion of planets, for example. But once again - and when will we ever learn? - we fell victim to hubris, as we imagined that, in discovering how to unlock some systems, we had found the key for the conquest of all natural phenomena."*

Where will these new findings lead us? Gould has some answers. *"The failure of reductionism doesn't mark the failure of science, but only the replacement of an ultimately unworkable set of assumptions by more appropriate styles of explanation that study complexity at its own level and respect the influences of unique histories. Yes, the task will be much harder than reductionistic science imagined. But our 30,000 genes - in the glorious ramifications of their irreducible interactions - have made us sufficiently complex and at least potentially adequate for the task ahead."*

Sources: Syngenta press release, "Researchers complete rice genome map," 1/26/01; Tim Radford, "Door opens on deeper mysteries." *The Guardian*, February 12, 2001; Stephen Jay Gould, "Humbled by the genome's mysteries," *The New York Times*, February 19, 2001.



**RESOURCES
&
DOCUMENTATION**

Organic Research: An African success-story, is an engaging short video about how a basic and integrated approach to technology development for small farmers in Africa can really make a difference. The video looks at some of the work of the Nairobi based ICIPE (the International Centre of Insect Physiology and Ecology) and of its director, Hans Herren. It shows how simple techniques based on local knowledge can keep pests and diseases at bay without creating dependence on agrochemicals and genetically modified crops.

Organic Research: An African success-story.
Produced by Florianne Koechlin. Order from: Alex Hagmann, Untere Rebgasse 22, Ch-4058 Basel, Switzerland. Fax: (41-61) 6914024, Email: ahagmann@filmvideo.ch

Big Spuds, Little Spuds is a video that demonstrates the impact of climate change and monoculture on potato in the highlands of the Peruvian Andes and Idaho. In doing so, it exposes the limitations of industrial agriculture. In Peru, the wholesalers' monopoly over the Lima potato market leaves farmers few alternatives to growing high-yielding varieties; in Idaho, processing companies only accept large Russet Burbank potatoes. In Peru, El Niño brought drought and frost that only some traditional varieties could resist; in Idaho, El Niño brought persistent rains that favoured the arrival of late blight, to which Russet Burbanks are susceptible. In Peru, the farmers using high-yielding varieties may get into debt and lose their lands if their crop is lost to bad weather or pests; in Idaho, any unforeseen pest outbreak means tens of thousands of dollars of supplementary costs for farmers, who may be

forced out of business. In Peru, at least, there is a positive sign: people are already documenting the characteristics of different varieties in an attempt to preserve and reintroduce them. In Idaho, on the other hand, farmers can only hope that the government provides them with resistant varieties.

Christoph Corves and Delia Castiñeira, *Big Spuds, Little Spuds, One World Views, 52 minutes.* Order the video from: Bullfrog Films, PO Box 149, Oley, PA 19547, USA. Fax: (1-610) 779 8226. Web: <<http://www.bullfrogfilms.com/catalog/big.html>>

Despite their success in sourcing products free of genetically-modified organisms (GMOs) for food manufacture, food retailers in the UK are not having the same success in obtaining GMO-free animal feed. This is largely due to the exercise of market power by the main US grain exporters (Cargill and Archer Daniels Midland [ADM]), both of which stand to benefit from the technology. Corporate Watch's briefing 'Control Freaks – the GMO exporters' analyses the conditions under which Cargill and ADM are likely to offer non-GM supply for feed, and how such conditions can be created. Activists attempting to secure non-GM feed supplies will find this briefing most useful. So will anybody intending to learn about the giants of the food commodity trading sector, the low-profile masters of our food supply.

Greg Mittit and Dirk Franke, 'Control Freaks – the GMO exporters,' *GE Briefing Series, Corporate Watch, December 2000, 36 pp.* Available from: Corporate Watch, 16b Cherwell Street, Oxford OX4 1BG, UK. Tel: (44-186) 579 13 91. Web: <<http://www.gm-info.org.uk>>



'Options for the implementation of farmers' rights at the national level,' is a new study presenting options for putting Farmers' Rights into practice at the national level in developing countries. After fleshing out the history, meaning and state of negotiations on Farmers' Rights in international law, Correa explores the core issues governments should be aware of when they translate Farmers' Rights into effective legal systems and practical actions. He is frank about the pitfalls of certain approaches – such as extending breeders' rights to farmers, or trying to enact Farmers' Rights as or within intellectual property regimes. He also stresses various supportive measures that governments can invest in, such as the development of "misappropriation regimes" and research programmes to strengthen traditional or ecological farming. Rather than try to reduce Farmers' Rights to a counter-weight against the encroachment of intellectual property rights, Correa keeps firm to the overall sense and objective of Farmers' Rights, at least as agreed at the international level. This is a useful background document for policy discussions on Trade-Related Intellectual Property Rights (TRIPs), *sui generis* rights and the promotion of more biodiverse, and more equitable, agricultural systems in the South.

Carlos Correa, 'Options for the implementation of farmers' rights at the national level,' *Trade-Related Agenda, Development and Equity (T.R.A.D.E.) Working Papers 8, South Centre, Geneva, December 2000, 48pp. E-mail: south@southcentre.org, Fax: (41-22) 798 851 or write to the South Centre, chemin du Champ d'Anier 17, POBox 228, 1211 Geneva 19, Switzerland. Web: <http://www.southcentre.org>*

Transforming bureaucracies: Institutionalising participation and people centred processes in natural resource management: an annotated bibliography is a new resource for people developing participatory methodologies to help local people to take greater control of the

development process. This walk through recent literature includes close to 390 references and critical overviews on seven key themes: Theories of organisational change for participation; Towards learning organisations; Gender and organisational change; Transforming environmental knowledge and organisational cultures; Nurturing enabling attitudes and behavior; Policies for participation; Methods for institutional and impact analysis.

Michel Pimbert *et al*, *Transforming bureaucracies: Institutionalising participation and people centred processes in natural resource management: an annotated bibliography*, IIED/IDS, London, UK, 2000, 214 pp, ISBN 1-899825-61-4. Copies of this publication are available from: the International Institute for Environment and Development, 3 Endsleigh Street, London WC1H 0DD, UK. Tel: (44-20) 73 88 21 17. Fax: (44-20) 73 88 28 26. Email: <bookshop@iied.org>

Seeds: the ecology of regeneration in plant communities is a new edition of a book originally published in 1992 that has been thoroughly revised and updated to include recent advances in seed science and plant ecology. These include evolutionary ecology of seed size, the role of fire and the importance of gaps in regeneration and seedling colonisation. Different contributions to a number of experts give a comprehensive overview of all aspects of seed ecology, which will be invaluable to advanced students and researchers in seed science and plant ecology.

Michael Fenner (ed.), *Seeds: the ecology of regeneration in plant communities, 2nd Edition*, CABI Publishing, Oxon (UK), December 2000, 416 pp, ISBN 0851994326. Order from: CABI Publishing, Wallingford, Oxon OX10 8DE, UK. Tel: (44-1491) 83 21 11; Fax: (44-1491) 82 92 92. Email: <orders@cabi.org>. Web: <http://www.cabi.org> Priced at £65.00 or US\$120.00



SEEDLING

is the quarterly newsletter of Genetic Resources Action International (GRAIN), an international non-governmental organisation (NGO) based in Spain. GRAIN promotes the sustainable management and use of agricultural biodiversity based on people's control over genetic resources and local knowledge, with a special emphasis on developing countries. *Seedling* aims to provide a platform for the exchange of news and analysis among people engaged in these issues. We need your input. Please send us information about your activities: articles, campaign materials, research results, criticism and suggestions.

SEEDLING

is published and edited as a collective effort of GRAIN staff. Janet Bell acts as managing editor. GRAIN staff currently comprise: Nelson Alvarez, Amèlia Foraster, Noemi Gaddi, Daniela Gimeno, Henk Hobbelink, Anna-Rosa Martínez, Raquel Núñez, Lene Santos, Aitor Urkiola and Renée Vellvé. Outside contributions are indicated in the by-line and should be attributed to their respective author(s). *Seedling* materials may be reproduced and disseminated freely. We ask only that the original source be acknowledged and that a copy of your reprint be sent to the GRAIN office.

SEEDLING

is available free of charge to groups and individuals in the South, as well as to the NGO community at large, upon request. Institutions and others in industrialised countries are charged a subscription of US\$35 per year, payable by cheque in US\$ to GRAIN. Please direct all correspondence to:

GRAIN

Girona 25, pral, E-08010, Barcelona, Spain
Phone: (34-93) 301 13 81. Fax: (34-93) 301 16 27.
Email: grain@grain.org Web: <http://www.grain.org>

Printed on recycled paper in Barcelona
Deposito Legal No. B-25.166.92
ISSN:1002-5154