Gene Technology in Food and Agriculture for Developing Countries

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Content

Gene Technology No Solution to Hunger in the Third World – A Synopsis

All over the world, genetically modified (GM) crops are being cultivated on ever larger land areas. The most widespread are GM soybean and GM corn. In the USA, Canada and Argentina they are already being grown on a large scale. However, they are also to be found in countries like Mexico, where the cultivation of genetically modified plants is forbidden by law, as pointed out in a study presented by Ana de Ita, of CECCAM (Mexico). Since the end of the 1990s, GM corn has become established in large parts of the country. The farmers' traditional seed became mixed in silos with corn imported from the USA. Despite the danger of this contamination to Mexico's corn biodiversity, the Mexican government is about to give in to the pressure of the agrobiotechnology industry and allow cultivation of GM corn.

The threat to small farmers' food security posed by GM plants was also the focus of the paper presented by Dr Vandana Shiva, of India. Taking as an example the Bt cotton grown in India, she described the methods used by corporations like Monsanto to sell their GM seed to small farmers. Instead of the promised profits, the farmers suffered massive losses. But according to Dr Shiva, the seed industry cannot be called to account for their false promises. For her, Vitamin A rice and potatoes with increased protein content are also nothing but eyewash, leading people to believe in scientific success and suggesting that genetic engineering helps improve nutrition. In reality, they endanger biodiversity, which in India in particular, plays a significant role in ensuring food security for the poor.

The corrupt wheeling and dealing and tricks of the transnational genetic engineering companies, and their involvement in politics were highlighted in the paper by Jeffrey M. Smith, author of the book "Seeds of Deception". And deception was also a theme taken up by Zambian scientist Dr Drina Banda Nyirenda. For two years, her country received GM corn as food aid without knowing it. She pointed out that Africa could feed itself without GM foods, as Zambia proved last year. However, a prerequisite for this is that the Government must support the farmers. Dr Banda Nyirenda also pointed out that Third World countries want to decide for themselves whether they want GM plants and GM food.

On this point, the developing countries and the European Union agree, as Dr Philippe Vialatte emphasized. In order to actually benefit from the advantages of biotechnologies – he used the broader term, as he put it – there needed to be new, democratic partnerships between the industrialized and the developing countries. Only with the help of public and private investment could technological solutions be achieved which were appropriate for the situation in question and affordable for poor people.

The paper given by Dr Christine von Weizsäcker focused on the ethical aspects of genetic engineering and how churches around the world approach this topic. The churches have been concerning themselves with genetic engineering for 30 years.

But for Pat Mooney of ETC (Canada), genetic engineering is already outdated, and will be supplanted by nanotechnology. In this technology the atom is the measure of all things: everything can be broken down into its atomic components and then reconstituted as required. In 2003 alone, US industry spent more than a billion dollars on this new technology. Pat Mooney described nanotechnology as a revolution whose threat the developing countries were not yet even aware of.

The Cartagena Protocol on the protection of biodiversity has been in force since September 2003. The protocol is an agreement on how to deal with genetically modified living organisms. It is the first international environmental agreement which embraces the so-called precaution principle. Christoph Bail, of the EU's Directorate-General Environment, called the

Protocol an agreement which strikes a fair balance between trade, environmental and development interests.

Dr Marianne Schauzu, of the German Federal Institute of Risk Assessment in Berlin, presented the new safety standards for foods with ingredients derived from genetically modified plants. These standards were approved by the Codex Alimentarius Commission in mid-2003. Safety is ascertained on the basis of a three-stage procedure. In the first stage the type of change is determined; in the second, possible unintentional effects are investigated, and in the third, possible toxic and allergenic potentials of the modified proteins are studied.

Gentechnik keine Lösung für den Hunger in der Dritten Welt – eine Zusammenfassung

Gentechnisch veränderte Pflanzen drängen überall auf der Welt verstärkt auf die Äcker. Am weitesten verbreitet sind Gensoja und Genmais. In den USA, in Kanada und Argentinien werden sie bereits großflächig angebaut. Aber auch in Ländern wie Mexiko, in denen der Anbau gentechnisch veränderter Pflanzen per Gesetz verboten ist, finden sie sich. Das zeigt eine Studie, die Ana de Ita, CECCAM, Mexiko, präsentierte. Dort hat sich seit Ende der 1990er-Jahre Genmais in weiten Teilen des Landes verbreitet. Das traditionelle Saatgut der Bauern hatte sich in Lagern mit dem aus den USA importierten Mais vermischt. Trotz der Gefahr, die diese Verseuchung für die Sortenvielfalt des Landes birgt, will die mexikanische Regierung dem Druck der Industrie nachgeben und den Anbau von Genmais zulassen.

Die Gefahr, die von gentechnisch veränderten Pflanzen für die Ernährungssicherheit der Kleinbauern ausgeht, stand auch im Mittelpunkt der Ausführungen von Dr. Vandana Shiva aus Indien. Am Beispiel der in Indien angebauten so genannten Bt-Baumwolle zeigte sie die Methoden auf, mit denen Konzerne wie Monsanto vorgehen um ihr Gensaatgut an die Kleinbauern zu bringen. Statt der versprochenen Gewinne mussten die Bauern gewaltige Verluste hinnehmen. „Aber“, so Dr. Shiva, „Wir können die Saatgutindustrie nicht für ihre falschen Versprechungen zur Rechenschaft ziehen“. Auch Vitamin A-Reis und Kartoffeln mit erhöhtem Eiweißgehalt sind für sie nur Augenwischerei, die wissenschaftlichen Erfolg vorgaukeln und den Menschen suggerieren, dass Gentechnik zur Verbesserung der Ernährung beiträgt. In Wirklichkeit gefährden sie die Pflanzenvielfalt, die gerade auch in Indien einen erheblichen Beitrag zur Ernährungssicherung der Armen leistet.

Die korrupten Machenschaften, Tricks und Verflechtungen der transnationalen Gentechnik-Konzerne mit der Politik waren auch das Thema von Jeffrey M. Smith, dem Autor des Buches „Seeds of Deception“. Und von Täuschung redete auch die sambische Wissenschaftlerin Dr. Drina Banda-Nyirenda. Ihr Land erhielt zwei Jahre lang Genmais als Nahrungsmittelhilfe, ohne es zu wissen. „Afrika kann sich auch ohne Gentechnik ernähren, Sambia hat das im letzten Jahr bewiesen. Voraussetzung allerdings ist, dass sich die Regierung hinter die Bauern stellt und unterstützt.“ Und noch eines machte die Wissenschaftlerin deutlich: Die Länder der Dritten Welt möchten selbst darüber entscheiden, ob sie Genpflanzen und Genfood wollen.

In diesem Punkt sind sich Entwicklungsländer und Europäische Union einig, wie Dr. Philippe Vialatte betonte. Um die Vorteile der Biotechnologie – er benutze den, wie er sagte, weiter gefassten Begriff – tatsächlich nutzen zu können, bedürfe es neuer, demokratischer Partnerschaften zwischen Industrie- und Entwicklungsländern. Nur mithilfe öffentlicher und privater Investitionen könnten technologische Lösungen verwirklicht werden, die an die jeweilige Situation angepasst und für die Armen erschwinglich sind.

Die ethischen Aspekte der Gentechnik und der Umgang der Kirchen weltweit mit diesem Thema stand im Mittelpunkt der Ausführungen von Dr. Christine von Weizsäcker. Bereits seit 30 Jahren beschäftigen sich die Kirchen mit der Gentechnik.

Für Pat Mooney von ETC, Kanada, ist die Gentechnik bereits überholt, und zwar von dem, was er als Nanotechnologie bezeichnet. Hier ist das Atom das Maß der Dinge, alles kann in seine atomaren Bestandteile zerlegt und nach Bedarf wieder zusammengebaut werden. Allein im Jahr 2003 gab die US-amerikanische Industrie mehr als eine Milliarde Dollar für diese neue Technologie aus. Er nannte sie eine Revolution, deren Bedrohung die Entwicklungsländer noch gar nicht wahrgenommen hätten.

Das Cartagena-Protokoll über die biologische Sicherheit ist seit September 2003 in Kraft. Darin wird der Umgang mit lebenden gentechnisch veränderten Organismen geregelt. Es ist

das erste internationale Umweltabkommen, in dem das so genannte Vorsorgeprinzip verankert ist. Christoph Bail vom EU Generaldirektorat Umwelt nannte das Protokoll ein „Abkommen, das in fairer Weise Handels-, Umwelt- und Entwicklungsinteressen gleichermaßen berücksichtigt“.

Dr. Marianne Schauzu vom Bundesinstitut für Risikobewertung, Berlin, stellte die neuen Sicherheitsstandards für Lebensmittel vor, die Bestandteile von gentechnisch veränderten Pflanzen enthalten. Diese Standards wurden Mitte 2003 von der Codex Alimentarius Kommission verabschiedet. Die Sicherheit wird anhand eines dreigeteilten Verfahrens festgestellt. Der erste Schritt stellt die Art der Veränderung fest, im zweiten werden mögliche unbeabsichtigte Wirkungen untersucht und im dritten schließlich mögliche toxische und allergene Potenziale der veränderten Proteine.

Dr Vandana Shiva, NAVDANYA, India

Bt Cotton and Golden Rice: the Struggle over Gene Technology for Development, Taking the Case of India

Gene technologies are the most important issue in trade, and the fact that the United States initiated the dispute in the WTO against the European Union on the GMO issue makes it very, very clear – this is at the heart of the trade difference. I really think that we had trade liberalization even prior to the World Trade Organization. After all, the IMF and the World Bank used to do the same trade liberalization. But there were two things the IMF and the World Bank could not do in trade liberalization. One was that they could not force countries to create new property rights, the intellectual property rights that have gone hand in hand with GM technologies, and therefore you needed a trade-related intellectual property rights agreement in the WTO.

The second thing that could not have been done without the WTO was the kind of case that has been brought against Europe, where people just decide "we are not going to use such kinds of food." Structural adjustment can at best use financial instruments to change macro-economic conditions, but it cannot force personal decisions in direct, conspicuous violation of democratic rights. That's where, as we see it, the whole constitutional structure of the WTO comes into play. So I see the GM issue at the heart of democracy. Because no matter where you see the introduction of GM crops, what is brought to the test is the democratic fabric of our societies. And the trade dispute between the US and the EU is an example, for the European Commission did not make the decision on the moratorium on its own; it was movements of citizens who said "we do not want GM crops in our neighbourhoods, we do not want GM foods in our supermarkets." And those movements then applied pressure to have the moratorium instituted earlier; and later, the kind of laws and rules that have been created reflect the democratic intent of European people.

GM crop growing in India regulated by law

In the case of India, the first set of GM crops that were brought in was the Bt Cotton. And in 1998 Monsanto put out ads in our papers saying that by the year 1999 Indian farmers would have a miracle variety called Bollgard and then they would be as advanced as American farmers. I heard of that and that is something very wrong with this because we have seed laws that require two years of testing. So how are they just announcing that by next year they'll be commercially selling? So we started a campaign to call for transparency in decision-making. Because in India there have been laws in force for years which stipulate exactly how GMOs are to be dealt with. Each step is specified.

Imports – there needs to be a clearance; open field trials – there needs to be a clearance; commercialisation – there needs to be a clearance. In addition we have the seed laws which say any new seed introduced into the commercial seed supply needs to undergo tests over two years in 20 agro-eco zones. India is a very, very diversified country – each of these areas needs a different kind of seed. And just to ensure the wrong seed was not introduced into the wrong agro-climatic zone we had the strict seed evaluation.

Uncleared trials

So when Monsanto announced they were going to be selling commercially the Bollgard Bt cotton seeds within a year, we started to move to see what was really going on. We found the sites of the first generation of trials and we also found out that Monsanto had never obtained clearance from the government organizations that should have been approached because they were mandatory: these were statutory bodies. The General Genetic

Engineering Approval Committee under the Ministry of Environment, doubles all environmental deployment, all environmental release of genetically engineered organisms.

So when we started to do this work, Monsanto got hold of a science committee which is under the Ministry of Science and the Department of Biotechnology and it is called the Recomponent Genetic Modification Committee, which basically sets the designs for safety, how you should get rid of your lab waste. What should be the design of your work in the lab for lab safety, inside contained environments; whereas the approvals are for releases. And they started to send these faxes to dealers. The faxes were sent after the days of sowing, after the planting. So in any case when they planted they had no approval. So we took them to the courts. We also evaluated the performance in the trials themselves. And there were very, very low yields. This was already in 1998. As the information about these trails started to spread, Indian farmers started to uproot and burn the genetically engineered trial crops. In three states the governments themselves ordered the destruction because in the Indian constitutional structure agriculture is a state subject. Agricultural decisions need to be made be regional parliaments, not by the national executive. The state-level authorities were totally bypassed and the government said, “this is illegal, nobody consulted us, companies are coming and selling and planting fields in our regions without permission,” so they ordered entire crops to be uprooted.

Corruption smoothed the way

Well, next year now Monsanto knows they must go to the Genetic Engineering Approval Committee and they go with trial data of 40 sites, even though there were not 40 trial plots available. Half of them had been destroyed. There was no cotton to harvest. And they had the magical figure of a 50 per cent increase. They keep bringing this fabricated data, we keep mobilizing boards, in the courts, in public opinion as well as in government decision-making authorities. And it was until last year that they actually managed to get the clearance. And that clearance – I’m pointing out this detail because in every country these clearances are usually obtained in a not very transparent and in a not very democratic manner. In India they got the clearance on 26th March last year at the peak of the genocide of the minorities in Gudjarat, when the entire country was preoccupied with “how do you stop the killing of the Moslems in Gudjarat”. The entire structure of our parliament – everyone was looking at really putting out the fire – within a day a meeting was hustled – half the committee members were present – Monsanto had already announced in the morning, when the decision had to be made, that they had got the clearance, the BBC was already announcing it long before the committee had completed its meetings, which to us was a clear signal that our regulatory system had been totally subverted by means and mechanisms that ordinary citizens cannot see because it is also paid in terms of corruption.

All decisions in genetic engineering, approvals granted, had been made through deals of kinds that have gone beyond parliamentary processes and beyond regulatory processes. And that is why I talk of the gene technology issue being the heart of democracy. Because if we continue to let every step of clearance undermine some more of our structures designed to protect the environment, farmer security and consumer health, then we will have no structures to do the work they are designed to do.

False promises

What we see in the GM technology issue is corruption being introduced from a northern corporation and governments that support that corporation. Where are we at right now? In India the first year of commercial planting of the first genetic engineering crop – it is not a food crop – has let to very, very bad performance. And India, I believe, is the only country in the south where very large diversified independent evaluations of the performance of Bt cotton took place. Partly because we are a democratic society, partly because our structures are so multi-layered that Monsanto can corrupt a ministry in Delhi but it can’t go down to

Maratoar, it cannot go and mass up with every scientist. They have to go and bribe too many Indians.

As a result of which independent studies from agriculture universities, organisations like us, and other NGOs have shown again and again and the data is absolutely consistent, there is no variation, that the average yield was two quintals, which is 200 kilograms, when the promise was 15 quintals. And the entire clearance was granted on the basis that this technology was going to serve the Indian farmers so well that every farmer would be making an additional 10,000 rupees per acre of profits. Well, every farmer, on the average, has lost 6,400 rupees per acre. Lost. And I mention that this is available even the day before Gudjarat: the agriculture department is asking for the centre to relook at the performance because it is so bad. The Government of India has stopped the clearance of Bt cotton in states beyond the first four in which it was allowed to plant it in the first season. Because of that hassle only four states were given the clearance to plant GM crops where the performance is so bad that there is no new GM clearance for any other state. With the very, very strong indicator that even the Government is having to think twice.

GM crops cause more hunger

I was at a debate yesterday that the Agriculture Ministry had called. And all the industry was there. Monsanto was there, Syngenta was there, Cargill was there, but our Department of Agriculture Secretary mentioned, he said, yes, biotechnology has a huge promise. But sometimes that promise is not being borne out. Theoretically it holds brilliant promise. Technology always does. It can do all kinds of things. But that promise is not what you assess the technologies on. You assess the technologies on the concrete applications that are available at hand. And there only two kinds of applications available at hand. Herbicide-resistant crops and Bt-toxic crops.

The herbicide-resistant crops are designed to decrease agricultural productivity in Third World situations and designed to decrease the availability of nutrition to Third World populations – every small, tiny farm and every holding in India – half an acre, one acre, and the tinier the farm, the more dense the biodiversity. We don't have the luxury to have spaced-out agriculture and I think it's time to stop using extensive agriculture for ecological agriculture. We need to use extensive agriculture for industrial agriculture because industrial agriculture reduces diversity on farms so much that it then has to spread out over far more acreages to get the same amount of output to meet the many functions. For example, from a field with local crops you get enough fodder from the straw of your grain – you get the straw and you get the grain. But the industrial varieties are designed to not produce straw, that's their whole design, to make short varieties. That means you have to plant another field for fodder. So you actually end up creating more pressure on land.

If you start to use herbicide-resistant crops in fields where 250 varieties are growing, each of which is serving a need, most of them are good in vitamin A and iron. Women in the Deccan, for example, an arid region with very little rainfall, use so-called weeds as food to meet their own and their families' iron requirement. That's what herbicide-resistant crops attack. Multi-cropping, diverse crops growing together – all of that means a decline in nutrition and there is no one to say herbicide-resistant crops will increase nutritional availability to the Third World. They are designed to decrease the numbers of plants that grow on your land, the diversity of plants that grow on your land, and in addition they target particularly women's work. Because even if the field in which this diversity is growing is not mine I have the option to work that field as a livelihood. I have the option to be able to get the grass from the field to take to my little goat. I have the option to work the field and do weeding and get some employment. So herbicide-resistant crops are a direct attack on the livelihood options of landless women in the South. And this accounts for 75 per cent of employment in agriculture in the Third World countries.

In addition of course, we are seeing other problems, for example in Canada where the GMOs are contaminating related crops, and in Third World countries where we have rich diversity, the hazard of biopollution is high, because we just have that many more plant varieties with which these genetically engineered crops can pollinate; and the recently concluded UK studies are showing that the distance of pollination is six times higher than was previously assumed: 23.6 kilometres is what they were finding – that's the kind of distance you have to think of when you are talking of so-called co-existence. You have to recognize that the next field that doesn't get contaminated has to be that far away. And in each crop it will be different. Herbicide resistance in related crops would basically then mean you get invasions. I have watched Punjab, the land of the Green Revolution. The wheat fields – if you go now – the wheat fields are 70 per cent weeds because of the use of herbicides. Because the weeds have become resistant to herbicides. And the wheat is only 25 per cent.

Trial data fabricated

The second application is Bt crops, the kind of crop that was introduced, where a toxin is put into the plant from a bacterium. And they say there is no impact. But it is a toxin and it has to have impact. And because of the cases we filed against Monsanto, which has bought a partnership and a subsidiary called Monsanto-Mahyco, we managed to get the data of their trials. And the fascinating thing is they say no impact. So you look at the table, okay. They have no impact on beneficial species. Your spiders won't be affected. Spiders are very, very important to control pests in fields. And you see, the reason there is no impact is that there was zero spiders, that there was nothing to kill. And no matter which aspect of the declaration is looked at, the studies are exactly of that kind. I mentioned the yield performance of genetically engineered Bt cotton in India. Thirty studies from India, including some government studies, showed that the performance was so low, but a journal called *Science* published a paper by two scientists, Matin Qaim of the University of Bonn's Centre for Development Research and David Zilberman, Professor at the University of California in Berkeley.

The study said Indian farmers had an 80 per cent increase in yields. So we started to look, and said, how do they get an 80 per cent increase in yields when all of us are finding a decline down to ten per cent? And it turns out these two scientists had never come to India in the commercial year of planting. They were given the data ready made by Monsanto. And they managed to get access to a journal called *Science*. And published the data. In the meantime the Indian scientists' studies don't reach policymakers. And that is the third hazard of genetic engineering. The fact that the very basis of knowledge, the very basis of science, the very basis of information on the basis of which sound decisions can be made – should be made – that that basis itself is getting eroded.

Undesirable scientists silenced

That's two reasons why the assault on independent science is so intense by the biotechnology industry. The first is that it is a new technology which has potential hazards and the industry does not want those risks assessed, it wants to put a lead. So it has to manipulate. And one example of how this lead is put is how any scientist who independently or because of government commissioning did a study has had to be removed. Just look at case after case. Dr. Arpad Pusztai, commissioned by the UK government, removed because he did an independent neutral study showing that genetically engineered potatoes had the potential to do harm, of course serious harm to human health. The scientist who did the work on Mexican corn contamination – removed from his ten-year position at Berkeley. No matter, where, which country you are, the pressure starts to get applied to scientists who do their honest job. Because an honest job means the risks to the environment and the risks to human health start to get addressed.

But there is a second reason why there is this very, very strong assault on public science without which no sound decision can be made for development in any context. And that is that the protests that are being brought are so useless. We don't need to put toxins into plants in a period where the FAO has shown that you can reduce the use of pesticides by half and double the yields as in the case of Indonesia with integrated pest management. That the alternative to pesticides is not making our plants pesticide factories, but ecological agriculture. These are proven, tested, evaluated, successful alternatives.

Two new miracle plants: Vitamin A Rice…

There is now the future promise. Okay, we won't be very smart and herbicide-resistant. We will give you a second generation of miracle crops. And the two miracle crops that are being talked about – one is the Vitamin A rice, the golden rice to remove blindness, and the other, more recently announced, is the protein potato. Why these promises also are actually, for our context, a waste of resources: the introduction of unnecessary risks and the destruction of Third World knowledge, especially women's knowledge. The Vitamin A rice will get, after ten years of development work, 30 micrograms of vitamin A equivalent into rice. If you do not polish rice you have vitamin A. There are native rices, a red rice we have in our collection from the high mountains, and we did tests with it. It has higher vitamin A than they'll get after ten years of genetic engineering. So farmers' breeding is already giving us Vitamin A rice. And maybe we need a campaign on Vitamin A rice from the farmers.

But the point is rice isn't the most important source of vitamin A. The wonderful thing about food and biodiversity is that different crops do different things. And no one crop is supposed to be the source of all nutrition. So the greens that we eat, the coriander, the curry leaves, those amazing drumstick tree leaves – vitamin A of 1400 micrograms, 70 times more – with no water use, no irrigation, no expense of any kind. And not just vitamin A but also iron, not just iron but many other things.

… and protein potato

The protein potato was introduced at the peak of the UK debate not announced in India, which also shows once again that we are used always for debates in Europe. That protein potato, I mean Indians would have laughed at the protein potato because we like potato, but in tiny quantities you know as a side dish, not like the Irish – it's not our staple. Well, they talked about feeding kids with the meals with protein potato and an impression was given that Indian kids were already getting it. And that was still an idea that they would take amaranth genes, put it into potato and in their claim increase protein availability. But if you look at it in a very, very direct way, you actually decrease protein availability because amaranth gives you 14 milligrams per hundred grams of protein.

When you introduce the gene into the potato, the protein in potato goes from 2 to 2.5. Taking a protein content of 2 as a basis for measuring the degree of success, an increase to 2.5 is of course immense. But if you take the protein content of amaranth as your basis, i.e. 14 grams, you realize it's low. You're actually decreasing nutritional availability. In the Indian diet, our most important sources of protein are the daals. Those protein sources give us 24 to 26 milligrams of protein. So you have 26 available in biodiversity and you are jumping down to 2.5, and you are getting away by saying you are increasing nutritional availability for the poor of the Third World. So I really sometimes want to weep that this level of totally fabricated and faked discussion is guiding policy for the world on a vital area like food. And that is why we have done two things in which we hope this kind of information becomes the basis for our future work, for decision making, for policy advocacy.

Global citizens' GMO challenge
I think it's time to pool the national scientific information, socio-economic performance information, people's choices and the democratic processes, pool it together into a worldwide citizens' consolidation…

I feel the time has come to know, just to collect all our different works and have one common strategy, and to show very clearly that the issue of Europe and the issue of the Third World in terms of the future of agriculture is really the same. Our solutions are the same. It's about sustainable farming, it's about allowing farmers to have a livelihood and survive, and it's about having good food for consumers that's healthy, nutritious, tasty and not full of hazards and potential risks.

Dr Drinah Banda Nyirenda, Zambia

Africa at the Crossroads: Sacrificing Safety or Feeding the Hungry?

Africa has been pushed to the crossroads because of its concerns over the raging controversies on Genetically Modified Organisms (GMO) raised by both scientists and civil society on health and environmental issues and the fact that Africa itself does not have adequate knowledge or the ability to determine the risks and consequences of this technology, which in turn makes it difficult to set up safety regulatory instruments. Despite food insecurity and hunger that plagues particularly sub-Saharan Africa, most countries have preferred to be cautious about introducing GMO crops and foodstuffs. The concerns about GMOs are more real for Africa because 80 per cent of the sub-Saharan population depend on small-scale and traditional agricultural crops that would be at risk of contamination.

Preferably not GM maize

However, that is not the only reason. In particular for people suffering from undernourishment, there is a real health risk if GMOs account for more than 90 per cent of their daily nutrition intake. This was also pointed out by the Norwegian Minister of International Development on 5th February 2003. He said, “there might also be a probability of higher risk when one is in a food crisis situation, consuming only one GMO product over time”. This is a reality for most African countries in a food crisis. In the Food Crisis of 2002/2003, over 2,000,000 Zambians, and 12,000,000 people in the six countries (Zimbabwe, Malawi, Mozambique, Lesotho, Namibia and Zambia) that had suffered the devastating drought of 2001/2002 were faced with consuming 90 per cent of their total daily food intake as GM maize. Most of these people were already weakened by hunger and disease (malaria and HIV/AIDS are highly prevalent). In such a situation the risks and fears for health were real.

The fact came to light that the Zambians had by chance received GM maize as food aid from the World Food Program. Someone at a press conference asked the question, and the gist of the reply was, “Of course it’s GM maize, it’s what you’ve been eating for the last two years.” Not even the President had been informed. The affair erupted into a scandal, because in Zambia GMOs are forbidden by law. Zambia opted to reject the GM maize for both health and environmental reasons.

The fear of environmental contamination and possible health risks to the people that would have consumed 90 per cent of their calories in the form of GMOs for 9 consecutive months were real. In addition, other local staple foodstuffs such as cassava existed in the country that could have been purchased and distributed as relief food. The World Food Program declined to assist in purchasing cassava and yet many donors and international NGOs are promoting it as a food security crop. This was unfortunate, because foods which Zambians have not consumed before were distributed as food aid (e.g. barley and bulgur wheat).

However, the local food redistribution and copying mechanisms, for example use of indigenous foods and wild food plants and use of cassava at community level, averted anny deaths from starvation while awaiting non-GMO food, which arrived in late January 2003.

Food security and environment at risk
Environmental contamination is a real danger for Africa because 80 per cent of the rural community depends on agriculture as a source of food and employment. These are the poor subsistence farmers who cannot afford to buy seed. If these farmers were to lose the ability to produce their own food then real hunger and even worse poverty would be perpetuated in Zambia.

On the other hand, the commercial farmer who can afford the technology is only interested in crops that yield a profit and does not give free food to the poor. In the long run the Government would now depend on international credit facilities to import food for its citizens, a prevalent option that is dangerous and unsustainable. This would be the worst form of colonialism because a very few multinationals would hold the lives of 80 per cent of the poor African people to ransom. The payback for such debts would probably be that the multinationals would take the land as collateral and eventually dispossess the poor of their farms and homeland.

Because GMO technology is a proprietary technology, owned and patented by the large corporations, the small-scale farmers of Africa cannot access it: it is too expensive. Thus, GMO technology does not have any real advantages for Africa but is perceived as a trap for poor small-scale farmers. The safety of the technology has not been proved, as evidenced by the many issues that have been raised over some of the products of this technology.

Biosafety first
Zambia believes in caution and in its own approach to choosing technologies that will benefit its people and bring sustainable growth. The main needs of the small-scale farmers are simply good political will that provides consistent and affordable credit facilities, infrastructure and good market conditions. The Minister of Agriculture and Cooperative, the Honorable Mundia Sikatana, said, “We need to adequately and comprehensively address the issue of GMOs. We would not like to create problems that we are unable to solve”.

Currently, Zambia has adopted a Biosafety and Biotechnology Policy and is now developing legislation to implement the policy. In addition, the Southern African Development Community (SADC) formed an Advisory Committee to come up with a regional position on biotechnology by 2004. This is being done, taking into account the Cartagena Protocol on Biosafety to the UN Convention on Biological Diversity and the African Union Biosafety Model Legislation, now in force.

Government support for small-scale farmers
Zambia has also demonstrated that good political will, Government commitment and financing to small-scale farmers can lead to food security. In the 2002/2003 agriculture season, the Government provided support to farmers by reducing the price of inputs (seed and fertilizer) by 50 per cent to 120,000 small-scale farmers and providing inputs to be paid in kind at harvest to 130,000 vulnerable but viable farmers (Programme Against Malnutrition (PAM), 2003) and special incentives to commercial farmers led to a doubling of the previous year’s production. Donors who provided resources through the Food and Agriculture Organization (FAO, 2002) of the United Nations complemented these efforts.

Although Africa is at the crossroads, with Government commitment, good governance, appropriate resource allocation and use of sustainable agricultural practices, it can attain food security, eradicate hunger and achieve economic growth without GMO technology.

Ana de Ita, CECCAM, Mexico

Mexico: Transgenic Contamination of Native Corn at the Center of Origin

In September 2001, the Mexican government confirmed that native Mexican corn in different communities in the Sierra Juárez de Oaxaca region had been contaminated by transgenics. This was first detected by Ignacio Chapela and David Quist from the University of California at Berkeley and their findings were subsequently published in the magazine *Nature*.

How the transgenic corn found its way to Mexico

Mexico annually imports close to 6 million tons of corn from the United States where in 2003, according to the U.S. Department of Agriculture, 32 million hectares, i.e. 40 percent of the total area on which corn is cultivated, were planted with genetically modified crops. The corn imported into Mexico contains genetically modified corn mixed in and that enters the country without any controls, separation or labeling. The planting of imported transgenic corn resulted in the contamination of native varieties of the plant.

Corn is Mexico's most important crop. It is the axis of peasant production and organization, the basis of the popular diet, the most commonly consumed grain and the heart of a culture. It is, in addition, part of humanity's patrimony. Annually, 3.2 million peasants – the majority (90 percent) with land holdings of less than 5 hectares – produce 18.2 million tons of corn, based on 8.2 million planted hectares, smaller than the area sowed with transgenic corn in the United States. Despite 50 years of "Green Revolution" in the country, hybrid or enhanced varieties of corn have not been able to successfully encroach on the 85 percent of the land planted with native corn.

Whole of Mexico affected

In January 2002, the national Ecology Institute (INE) and the national Commission for the Use and Knowledge of Biodiversity (Conabio), both of which are divisions of the Environment Ministry, which at the time occupied the presidency of the Interministerial Commission on Biosecurity and Genetically Modified Organisms (Cibiogem) confirmed the presence of transgenic landraces in native corn obtained in 15 communities in the states of Oaxaca and Puebla and in grains in a warehouse operated by the government agency Diconsa, a distributor of foodstuffs for consumption by low-income groups in rural areas. The INE and the Conabio analyzed 800 samples of corn seed obtained in 20 communities in the state of Oaxaca, in two locations in the state of Puebla, and in the Diconsa warehouse located in Ixtlán de Juárez, Oaxaca. In 15 of 22 localities transgenic landraces were found.

The Agriculture Ministry also carried out analyses of native corn in different regions of the country, but has not made public the results of its study or information on where its samples were collected.

At the same time, several indigenous and peasant organizations in Chihuahua, Puebla, Oaxaca, Veracruz, Hidalgo, Jalisco, Durango, San Luis Potosí, and Tlaxcala, with the support of the German foundations Misereor and Bread for the World, conducted investigations aimed at obtaining information on the current situation of the corn that they cultivate in 104 rural communities in eight Mexican states. These efforts were undertaken with the support of CECCAM (Center for Studies for Changes in the Mexican Countryside). CENAMI (National Center to Support Indigenous Efforts), Casifop (Center for Social Analysis, Information and Popular Education), the ETC Group (Action Group on Erosion, Technology, and Concentration), UNOSJO (Union for the Organization of the Sierra Juárez

de Oaxaca), AJAGI (Jalisco Association to Support Indigenous Groups), and the Comtec of Chihuahua.

Ten percent contaminated

As part of the "Responses to Transgenic Contamination of Native Corn Project", we conducted the first analysis of corn on the part of peasant and indigenous organizations in January 2003, based on more than 105 samples from 500 plants, and the second in July 2003, with more than 306 samples from 1500 plants and test locations. Based on tests to determine the presence of endotoxins through the use of the DAS-ELISA procedure, the Fumigaciones y Mantenamienzo de Plantas, S.C. laboratory, using Agdia brand commercial kits, conducted the diagnosis on the presence or absence of four types of proteins that indicate the main commercial varieties of transgenic corn. Three of them identify Bacillus thuringiensis (Bt) transgenic corn, which is resistant to certain insects and lepidopterons, namely Bt-Cry 1Ab/1Ac, which is distributed under the commercial trade name YieldGard, by the Monsanto company, Knockout from Novartis (currently owned by Syngenta), and NatureGard from Mycogen. The Bt-Cry-9C present in StarLink Corn from Aventis (currently owned by Bayer) was initially prohibited for human consumption in the United States, and the Bt-Cry 1C from Mycogen and Ecogen industries. Transgenic corn resistant to the herbicide RoundUp Ready from Monsanto (known locally as Faena or Basta) was identified with the CP4 EPSPS protein. Each of the communities participating in the diagnosis defined the size of their sample and the plants were selected randomly.

The results were as follows:

- Transgenic contamination of native varieties of corn was detected in communities in the states of Oaxaca, Puebla, San Luis Potosí, Chihuahua, Veracruz, Tlaxcala, Morelos, and State of Mexico.
- In 18 of the 104 communities sampled (17.3 percent) between 1.5 percent and 33.3 percent of the samples registered positive results.
- Of the total 306 samples (from all the communities and sampling locations), results from 32 samples (10.4 percent) were positive. In those 32 positive samples, 59 instances of transgenic contamination were detected.
- In 5.6 percent of the samples, the protein Bt-Cry 1Ab/1Ac was detected; 5.22 percent of the samples were positive for Bt-Cry-9C, and 8.5 percent tested positive for resistance to RR herbicides.
- In 4.9 percent of the samples, and in almost half (46.3 percent) of the positive samples, the results were concomitant for two or three different types of Bt – Bt-Cry-9C and Bt-Cry 1Ab/1Ac – and the protein indicating resistance to herbicides, CP4 EPSPS.

The remaining one percent of the samples was positive concomitantly for two types of transgenics. About 0.65 percent of the sample registered the presence of resistance to herbicides together with Bt-Cry 1Ab/1Ac, and 0.33 percent tested positive for resistance to herbicides and Bt-Cry-9C.

The tests conducted by the social and civic organizations confirmed that the contamination of native corn varieties with different types of transgenes is present in different regions of the country and is not an isolated phenomenon, nor is it confined to certain communities in Puebla and Oaxaca. On the contrary, the presence of trangenes was registered in different states around the country and in outlying regions of the urban centers, in which seasonal peasant agriculture is practiced on land extensions of around one hectare, in which native seed is planted, with very few or no chemical inputs whatsoever and whose production is basically earmarked for self-consumption. Transgenic contamination of the native varieties of corn is widespread and producers do not have the possibility of detecting it by simple methods.

Government gives in to pressure from industry
After more than two years of having confirmed the transgenic contamination of native corn varieties, the Mexican government has not taken any serious action to deal with the problem. On November 4, 2003, the Agriculture Ministry, which currently occupies the presidency of Cibiogem, announced that it would lift the ban on the experimental planting of transgenic corn that has been in effect since 1999, which was based on the risks that transgenic corn could cause to the diversity of corn varieties and their wild relatives in the centers of origin. The Cibiogem thus responded to the interests of the agrobiotechnology industry, which has been pressuring to lift the de facto moratorium that had prevented transgenic corn from being planted in Mexico, both for experimental as well as commercial purposes.

In Mexico, due to it being the country that is the center of origin and diversity, up until now it was forbidden to plant genetically modified corn in the open field. Since the end of 1998, the National Committee on Agricultural Biosecurity (CNBA) established a de facto moratorium by not accepting new applications to carry out field tests with transgenic corn, and much less to allow its planting for commercial purposes. The lifting of the moratorium for experimental testing with genetically modified corn could be the first phase in subsequently allowing the commercial planting of transgenic corn. This is currently occurring with genetically modified cotton, of which 100,000 hectares were planted, as a pilot or “pre-commercial” program, even though Mexico is the center of origin for the crop.

Corn production, contrary to the situation in the United States, is an open system. More than 80 percent of the surface area planted with corn in Mexico employs native seeds, selected each harvest cycle by the peasants involved. The exchange of seeds between producers and regions is a constant and this is what has allowed the diversity in varieties of corn in the country, and is also a characteristic of each land parcel. This system is very different from the one that emerges when for each harvest season farmers purchase industrially produced, homogeneous seeds.

Dr Philippe Vialatte, European Commission, DG Development

GMOs in the Context of Food Security Programmes and Agricultural Development Cooperation – Views from the European Commission

First of all, I would like to indicate clearly that we in the European Commission (EC) are talking about biotechnologies and not biotechnology. It can make of lot of difference when referring to gene technology. For example, gene markers and Marker Assisted Selection do not create GMOs. These technologies may well facilitate and speed up conventional breeding, leading to better adapted varieties for the people who need them.

The public debate around gene technologies has often been narrowly restricted to GMOs. In my view, this has hampered the full recognition of the potential and the associated risks of biotechnologies.

Any EC point of view on development issues is based on the Community Development policy. It is grounded on the principles of

- sustainable, equitable and participatory human and social development, and
- the promotion of human rights, democracy, the rule of law and good governance.

In this context, the European Union has clearly spelled out its policy on life sciences and biotechnology (at this time, the S had not yet been endorsed) in a Communication, issued in January 2002, referred to as COM (2002)27 and entitled “Life sciences and biotechnology: a strategy for Europe”. It has been largely supported by the Council of Ministers of the Union and by the European Parliament at the end of last year.

The main messages related to developing countries could be summarized as follows. They are in fact the conclusions of the January meeting.

Life sciences and biotechnologies are tools
Whatever policies and strategies Europe elaborates regarding life sciences and biotechnologies, they will have major impacts on developing countries. Therefore, the interests of developing countries must be taken fully into account by the EC when main "routes" for the future are considered.

Life sciences and biotechnologies will not be the panacea to solve all problems in developing countries but will be one of the important tools in contributing to solving some issues.

Developed and developing countries have common fields of interest in life sciences and biotechnologies. New, informed, democratic, ethical and transparent partnerships should be encouraged between developed and developing nations to take full advantage of both promising technologies available primarily in the North and the extraordinary biodiversity potential available primarily in the South.

Demand-driven and tailored solutions for poor small-scale farmers require coordinated commercial investments and public funding at national, regional and international levels to work out technological packages adapted to local conditions and affordable for the poor.

Environmental and health concerns are paramount when considering life sciences and biotechnologies and they must be fully integrated in strategic choices contributing to sustainable development, in accordance with international commitments and Conventions and the precautionary principle.

In other words, we look at life sciences and biotechnologies as tools among others that can contribute to poverty reduction and food security in developing countries. They should in all cases be utilized in accordance with the precautionary principle and in full respect of national sovereignty and international commitments.

The Action Plan of the Communication
It details what Europe will do, within its mandate and its obligations under international agreements, to reach the objective of future Community support, i.e. to ensure the safe and effective use of modern life sciences and biotechnologies in developing countries.

The activities foreseen in the Action Plan of the Communication will be carried out in close collaboration and coordination with the Member States of the Union. In the agricultural sector, the main areas of support will include:

- Research at local, national, sub-regional, regional and international levels in a coordinated manner with the participation of all stakeholders, particularly from civil society as well as from the private sector.
- Conservation and sustainable use of genetic resources in developing countries and their equitable sharing of benefits arising from their use.
- Support to developing countries for responsible and careful use of modern life sciences and biotechnologies, based on their autonomous choice and on their national development strategies, and including capacity building and appropriate administrative, legislative and regulatory measures

Several of these activities are already ongoing, through, for example, EC support to agricultural research for development at national, sub-regional, regional and global level.

Agricultural research on various levels
At sub-regional level, we proposed an innovative approach that has been extensively discussed with many partners in developed and developing countries. It has been endorsed and will be applied in the coming months in the Western and Central, Eastern and Southern sub-regions of Africa where we are implementing or preparing research programmes for a total amount of about € 70 M.

This approach is based on research networks and competitive funding mechanisms, taking advantage of experiences gained at national level (for example in Senegal) and at international level, particularly by our colleagues from the INCO-DEV programme in the Research Directorate-General. Projects on conservation and sustainable use of genetic resources and equitable sharing of benefits arising from their use may very well be included where the sub-regional organizations so wish.

At international level, the EC is one of the main donors (number 3 or 4 depending on the year, out of more than 60 contributors) to the Consultative Group on International Agricultural Research – CGIAR. Our strategy document guides us to support the CGIAR activities related to genetic resources (conservation, characterization, conservation, improvement and use) and to international policies. Again, these actions are very much part of the Communication's Plan of Action, as indicated before. Our annual contribution to the CGIAR projects related to these two topics amounts at about € 22 M.
Likewise, we are preparing our support for the Global Forum on Agricultural Research – GFAR – hosted by FAO. It aims at "Strengthening the Participation of Farmers' Organizations and of Non-Governmental Organizations in the Global Agenda of Agricultural Research for Development".

Decisions on GMOs must be made locally
Of course, issues surrounding GMOs are very important as these can have huge implications on human and animal nutrition, health, the environment and biodiversity, trade, property rights and ethics.

Surprisingly enough, European concerns with GMOs do not dominate the discussions on the production of vaccines and pharmaceuticals. The reasons for this should be clarified. They may relate to the sense of "need" we give to these products in our societies.

It is a different story when it comes to discussing use of GMOs in agriculture and their release into the environment. The discussions regarding GM maize and the food crisis in Southern Africa last year is one of many examples of a polarized debate that is likely to occur again and again if we all do not respect local sensitivities and concerns.

In the Southern Africa crisis, the EC position has been very clear: the decision on whether or not to accept GM food must be made locally, by local authorities who can fully appreciate local conditions, habits, policies, needs, ethics, etc. Models cannot be simply transferred from developed countries as blueprints.

We therefore respected fully the Zambian decision not to accept GM maize because its impact has not been adequately assessed in the African context. Respecting this legitimate right will increase the chances of biotechnologies being more broadly accepted to play a useful role in the fight against hunger and poverty.

The Commission fully recognizes also the right of third countries to adopt the legislation they deem necessary with respect to GMOs, in line with the provisions of international agreements such as the Sanitary and Phyto-Sanitary Agreement and the Cartagena Protocol ratified by the Commission in August 2002. We can support developing countries, at their request, in establishing the national, and more appropriately regional, capacity development required to deal with the complex issue of legislation and regulation.

"Give priority to rural development"
The developing countries should be better integrated into the global knowledge society, to enrich the debate about the use of life sciences and modern technologies, to foster the dialogue between developed and developing countries and to help mobilize resources to ensure food security for everyone.

To achieve these objectives, it is of utmost importance that developing countries themselves decide to give priority to rural development as a whole, and more particularly to agriculture and agricultural research, as key areas for the allocation of investments, keeping in mind as well the need to preserve national resources and the environment.

Pat Mooney, ETC, Canada

Nanotechnology in the Fast Lane

The National Science Foundation in the United States says that the market value – sales value – of nanomaterials in the year 2015 will be one trillion dollars. They say that by around 2010, half of the world's pharmaceutical industry will be based upon the use of nanoscale technologies. And that virtually the entire semiconductor industry will be based upon nanoscale technologies.

As you look across the whole spectrum of economic sectors (every sector of the economy is involved because atoms are the building block of everything living and nonliving), every aspect of industry is participating in and involved in the development of nanoscale technologies. The impact will be everywhere. It will be in the automobile industry, in the aerospace industry, in pharmaceuticals of course, in agriculture; there is no aspect that will not be touched by this.

Completely normal

It is happening incredibly rapidly and the question you might most want to ask yourselves is: if this has been around for so long, and is so customary and normal, how come we haven't heard about it before? This is a new topic for most people and why is it that we are not aware of these kinds of dollar volumes of impact coming very, very quickly. And anyway, if it is so customary, what does it really mean for developing countries, for the poor of the world, actually the poor in the UK or Canada, where I come from, or the poor in Asia, Africa and Latin America?

I would argue that how nanotechnology will finally play out, the implications for the Third World, for the poor, are absolutely enormous. Developing countries are going into WTO negotiations in making trade deals, trade-offs between North and South for commodities, for access to markets, for investment opportunities, without an awareness of the real implications that nanotechnology is going to have for those eventual markets, and that needs to be understood by those countries very quickly, or we are all in trouble.

Why is it so important? I think one of the particular aspects of working at the scale of atoms, at the nanoscale, is that we move from classical physics to quantum physics. And at that stage everything changes, the conductivity of an element in the periodic table, its electrical conductivity, its stress tolerances, its temperature tolerances, its elasticity, every aspect, even the colour of an element will change profoundly when you move down below the level of 100 nanometres in size to 50 or 70 or 20 or 10 nanometres. Everything changes if you think of the periodic table as being in terms of working elements, 92 working elements, that we get to play with to build everything in the world. Because of quantum physics, we suddenly have a palette of colours to work with which is several times greater than it ever was before. Not 92 elements anymore – it's perhaps two or three hundred elements.
So now the building blocks of things are much greater in number than ever before and that changes things enormously for the world economy, because it means working at that scale and building from that scale you can change and mix and match the elements you want to work with.

Substitute for Nature
No longer is geography a critical factor in raw materials and that's an amazing thing. Suddenly you no longer have to go to get your copper from Peru or your cobalt from Zambia or your tin from Malaysia. Perhaps you can get the same qualities you want for manufacture by designing new compounds or developing materials building from the building blocks upwards to make these new products.

This means that if you are developing a copper mine in Peru, by the time you have negotiated your agreements on trade and have made deals to get foreign and direct investment, by the time that copper mine comes on stream there may no longer be a requirement for copper in the same way that there is today. Either much less copper will be required or possibly no copper at all. Perhaps it can be replaced by something else such as chalk. Carbon calcium, the building block of chalk, is what crumbles on the black board but down at the nanoscale you've got a material which is approximately 100 times stronger than steel and six times lighter.

So instead of having to look at how you buy your iron and your ores to build into steel, maybe you just use very simple and commonly available building blocks to create even more effective materials. That is why from the automobile industry, to the space agencies, to the pharmaceutical industry, everybody is fascinated by the possibility of using quantum physics to develop new products.

Not only will it affect developing countries in terms of the mining industries, which are extremely important in their ability to export raw materials and even finished products to us, it will also affect living materials, the textile industry. With nanotechnology, negotiations by developing countries on improved access to markets in the USA or Europe are irrelevant. For instance, we find that someone like Warren Buffet, the famous investment billionaire who during the "dotcom" days at the turn of the 21st century never bought into the dotcom companies, but bought Proctor and Gamble and Walmart stocks, is buying textile companies, all of them very cheap, most of them bankrupt, some of them in Chapter 11 negotiations in the United States. Textile companies are now being bought because Buffet believes that with nanotechnology he will actually be able to bring back the industry to North America. It will be possible to use nanotextiles and nanotextiles are available now. That will allow him to have a technology which he will be able to control in and from North America.

Developing countries aren't aware of that. The implications will be the transformation of their economies because of something that will take place in Burlington Mills in North Carolina. Then we have a problem and it will not just affect textiles it will affect food products as well. The US Department of Agriculture has a draft paper available on its website now which looks at the potential for agriculture to use nanotechnology. They talk about the ability to reduce crop waste, which is good, they talk about the ability to monitor crops more effectively, which can be good, can be bad as well; they talk about ways in which they might be able to fundamentally redesign plants again, not using transgenics but getting down and manipulating the atoms themselves, manipulating the molecules, changing the DNA itself within the existing plant. That would be the long-term possibility and if we are not aware of the discussions going on in the US Department of Agriculture and how that might affect the food system, the food chain, and exports, again developing countries lose out.

If we look at this we have to understand that we are faced with, good or ill, a technology wave coming towards us. It is the biggest technology wave the world has ever seen. It is the manipulation of all the materials, living and nonliving, again at the nanoscale. We've never done that kind of thing before.

Led by the world's largest corporations
At the beginning of the last century life became movable because of genetics and then genomics as we have evolved throughout this previous century. We have seen that life can now be mixed and matched and married, for good or for ill again, we have seen many concerns about that which we have only briefly touched upon this morning.

And now with nanotechnology, with the one big step down from genes to atoms, matter is moveable, matter is malleable and again, as so often in the past, the geographic location of raw materials becomes relatively irrelevant for the world, and that is a profound change again in the world economy.

So we should be concerned about that wave when it comes because the other reality of the history of technology waves over the last 550 years is that every wave has a crest and a trough. The rich ride the crest, the poor are in the trough. The poor haven't simply lost by comparison. The poor have lost in real terms in every technology wave. The poor got poorer. That happened with the dotcom industries in the United States during the 1990s: the gap between rich and poor widened in the United States. It didn't just widen, the poor got poorer. In every situation throughout history, that has been what has happened, it will happen again with this revolution, this new wave coming upon us now.

This wave again involves everything, it involves all the living materials, all the nonliving materials, and the ways in which they can be mixed and matched and put together. And that wave is being led by the world's largest corporations. Unlike biotechnology, which began in the universities and moved from the university campus to little boutique companies; then those companies were eventually bought by the big multinationals. In this case we are seeing a revolution which is in the universities yes, in small companies also, but also at Exxon and IBM, at Hewlett-Packard, at Dupont, at Dell, at Monsanto, at Kraft Foods: all of these places are also involved in the same revolution. All working together at the nanoscale with impacts for all of us, and we are not even aware of it and we haven't even discussed it.

We need to get ahead and analyze what has to be done for us to manage these technological waves in a way in which society is in control. The only way we can do that frankly is through something which we call the need for creating an international convention for the evaluation of new technologies. An international legal structure which allows us to look ahead down the road at robotics, which is part of nanotechnology in fact, and all the other information technologies and try to analyze them ahead of the game. Instead of running 7 or 8 years after them

Marianna Schauzu, Center for Novel Foods and Genetic Engineering,
Federal Institute of Risk Assessment, Germany

Codex Alimentarius and the New Safety Standards for GMOs – How Safe Our Food and Food Aid Will Be in the Future

At international level, food standards are set by the Joint FAO/WHO Codex Alimentarius Commission (CAC) which was established in 1963. It is an intergovernmental body established to protect consumer health and ensure fair practices in the food trade. The 23rd Session of the CAC, held in 1999, agreed to create an *Ad Hoc* Intergovernmental Task Force for Foods Derived from Biotechnology to develop standards, guidelines and recommendations regarding the safety and nutritional aspects of genetically modified foods. The Ad Hoc Intergovernmental Task Force has

- 35 member countries as well as
- international governmental (EC, EU Council, FAO, WHO, WTO) and
- international non-governmental organizations (49th Parallel, ASSINSEL, BIO, CI, CRN, CropLife International, EUROPABIO, Greenpeace International, IACFO, ICA, ICGMA, ILSI, ISDC, IUBS, WVA)

Guidelines for food safety

The Ad Hoc Intergovernmental Task Force for Foods Derived from Biotechnology elaborated the “Draft Principles for the Risk Analysis of Foods Derived from Modern Biotechnology” and the “Draft Guideline for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants” and the “Draft Guideline for the Conduct of Food Safety Assessment of Foods Produced Using Recombinant-DNA Microorganisms”. Principles and Guidelines were accepted at the 25th session of the Codex Alimentarius Commission, held from 30 June to 5 July 2003.

Since the creation of the Ad Hoc Intergovernmental Task Force for Foods Derived from Biotechnology, there have been various joint FAO/WHO expert consultations on foods derived from biotechnology, focusing on

- safety aspects of genetically modified foods of plant origin,
- evaluation of allergenicity of genetically modified foods, and
- safety assessment of foods derived from genetically modified microorganisms.

Key issues of these consultations were pre-market safety assessments, which were performed on a case-by-case basis and a comparative approach, using the “Substantial Equivalence” of GMO Derived Foods *versus* Conventional Foods.

Individual steps in food safety assessment

This concept of substantial equivalence is based on the idea that existing foods can serve as a basis for comparison when assessing the safety and nutritional value of a food or food ingredient that has been modified or is new. It is not a safety assessment in itself but a starting point used to structure the safety assessment of a new food relative to its conventional counterpart.

The Goal of the Safety Assessment is a conclusion as to whether the new food is as safe as the conventional counterpart, taking into account the dietary impact of any changes in nutritional content or value. The safety assessment should be reviewed in the light of new scientific information that calls into question the conclusions of the original safety assessment.

The procedure for assessing food safety is laid down in a comprehensive list of regulations. The most important of these are:

- description of the GM plant
- description of the host plant and its use as food
- description of the donor organisms
- description and characterization of the genetic modification: analysis of inserted and surrounding DNA sequences and resulting gene products
- genetic stability of the new trait
- assessment of possible toxicity of newly expressed substances
- assessment of possible allergenicity of newly expressed proteins
  - weight-of-evidence approach
  - animal models as a future possibility
- assessment of antibiotic resistance marker genes
  - not acceptable if compromising the therapeutic efficacy of antibiotics

The Food Safety Assessment also includes an Investigation of unintended effects. In order to ascertain these, the following specific studies are carried out:

- agronomic and phenotypic characteristics
- compositional analyses of key components
- potential effects of food processing
- consequences of intentionally altered nutritional quality or functionality

Last not least, the Food Safety Assessment also includes animal feeding studies. These may be warranted on the whole foods if the composition of a GM plant-derived food is not comparable to conventional foods, or if the characterization of the food indicates that the available data are insufficient.

The GM soybean example

The process can be illustrated taking the GM Soybean as an example.

1. Characterization of the genetic modification
   - modified by particle gun bombardment
   - stable insertion into plant genome of *cp4 epsps* gene with CaMV 35S promoter, CTP from *Petunia hybrida*, nos terminator from *Agrobacterium tumefaciens*
   - expresses CP4 EPSPS from *Agrobacterium* strain CP4, resistant to glyphosate that inactivates plant EPSPS enzymes
   - Additional molecular information provided in 2000 as result of application of more sensitive and precise methods revealed a second insert consisting of a cp4 epsps segment and another cp4 epsps fragment flanking the nos terminator
   - The new information, including analyses of potential transcripts and fusion proteins, was reviewed by UK ACNFP, ACAF, ACRE: The information does not raise any new safety concerns, previous risk assessment remains valid.

2. Analyses of unintended effects
   - Agronomic and phenotypic characteristics (field trials)
   - Compositional analyses:
     - Macro-nutrients (protein, fat, fibre, carbohydrates)
     - amino acids
     - fatty acids (e.g. linoleic acid, oleic acid)
     - anti-nutrients (e.g. trypsin inhibitor, lectin, phytate)
     - isoflavones (phytoestrogens: e.g. genistein, daidzein)
     - inherent allergen pattern
   - Feeding studies (dairy cattle, chicken, catfish, rats)

3. Analyses of the toxic and allergenic potential of the newly expressed protein
   - search for amino-acid sequence similarities to known toxins and allergens
   - studies of stability to processing conditions, e.g. heat, acid
   - degradation studies in simulated digestive fluids
   - acute toxicity study in mice

Conclusions

The concept of substantial equivalence is used to identify similarities and differences between a new food and its conventional counterpart. It aids in the identification of potential safety and nutritional issues and is considered the most appropriate strategy to date for assessing the safety of foods derived from recombinant-DNA plants.

The safety assessment carried out in this way does not imply absolute safety of the new product; rather, it focuses on assessing the safety of any identified differences so that the safety of the new product can be considered relative to its conventional counterpart.

The potential occurrence of unintended effects is not restricted to the use of in vitro nucleic acid techniques. Rather, it is an inherent and general phenomenon than can also occur in conventional breeding.

The data and information necessary for the assessment of unintended effects, when considered in total, provide assurance that the new food is unlikely to have an adverse effect on human health.

The work of the Task Force provides proper guidance to ensure that GM crops make an optimal contribution to World food security, food safety and nutritional quality, and sustainability, as Ezzeddine Boutrif of the FAO's Food Quality and Standards Service stated at the Third Session of the Codex Task Force in 2002.

Christoph Bail, European Commission, DG Environment

Chances and Limitations of the Cartagena Protocol

Christoph Bail's article is a behind-the-scenes report on the Cartagena Protocol negotiations, describing in particular the final phase just before the Protocol was finally published.

The negotiations were a success because all governments were involved; they could make proposals, they were considered, they could be heard. It was important that at some point the key negotiating interests were identified and they were not traditional G77-OECD, it was not just a North-South issue. Clearly, the developing countries were speared to a great extent, particularly the Latin American countries. But there were also nuances among the others, and among the exporters, too, it was clear that they had to find a configuration of those who have a more or less common cause. They turned out to be the minor group.

Open, transparent process

Then the real negotiations started. I think it was very important that they managed to make the Colombian Minister the Chairman of the final Protocol meetings. He was very inventive in pushing the process, in finding new mechanisms – we had a meeting in Vienna, where he decided there should be five groups now around one table – it was called the Vienna setting. One of those five groups was the so-called compromise group which were all the OECD countries that were neither in the minor group nor in the EU; and then there were the East Europeans. And their positions were, let's say, roughly speaking, relatively close and similar to the EU position. So we still were roughly in the middle trying to get the compromise and see how we could bridge the gap between the like-minded, the majority of the developing countries, and the minor group.

But it was an open process, it was transparent, it could be seen by everybody in the negotiations, even the journalists were there, there were demonstrations, it was in Montreal, and I think there was a lot of pressure at this time; and finally we found an agreement in an area which was as we all know extremely contentious and still is contentious and it still remains to be seen whether this Cartagena Protocol will become the central international, multinational regime for biotechnology. I'm not going now through all the details of the Protocol, there is no time. I think many of you know it in any event. I just want to recapitulate a few of the important features. I should have mentioned that also – what was important at the end of the process – the political level, the ministers were involved, they were not the negotiators, but behind the scenes they were involved, they were there and they sat around with the Colombian minister to confront each other on the two or three fundamental consensus issues, and there was also a political process at the end.

Primary objective: protection for biodiversity

Now the objective of the Protocol – it's a Protocol under the Biodiversity Convention, is to ensure an adequate level of protection for biodiversity but also taking human health into account. So human health is in there; it's not the primary objective, but of course in the context of taking decisions with respect to the importation of seed or food. In the first instance we look at the possible environmental impacts, make risk assessments but in the context you also look at possible implications for health. It is not primarily a health instrument and you may also take into consideration socio-economic implications. That's the key objective. It has a very wide scope. It covers all areas, with one exception – pharmaceuticals for humans, which is an exception on which also the EU insisted very much because we argue that this is not really primarily an environmental issue and there are also other international regimes dealing with pharmaceuticals for humans.

The central focus in terms of the substantive provisions is on notification, on information sharing, on cooperation between exporters and importing countries, it provides for a clearing-house mechanism – and that's the main focus.

AIA procedure crucial

And the central procedure is the AIA procedure – advance informed agreement. In other environment agreements we talk about prior informed consent, PIC. It is similar, and it means that prior to the first import of a LMO, a living modified organism which is slightly different from a GMO or very much different, I'm not a scientist, prior to the first import of a LMO intended to be introduced into the environment, there must be a procedure of notification, of providing documentation for risk assessment and within a given time frame a decision by the importing country on whether or not they accept it, where they want conditions, where they want further information, and there needs to be a consent prior to the first transboundary movement.

Whether that consent is absolutely required under the Protocol in all cases is bit of an open question. What happens is there is no answer within two or three years, but in principle it is a very strict procedure but it is limited in order to allow the importing country to do a proper risk assessment, have all the information and then, in the light of that, a scientifically based risk assessment, to take a responsible decision. This procedure does not apply to research, to contained use, there you have the more limited information exchange procedure because contained use is not considered to contact with the environment, it doesn't apply as such to transit operations and it doesn't apply as such to commodities, to transboundary movements of food, feed or processing. There you have an information sharing, an identification procedure which goes to the safety clearing-house where the information must be given ahead of any shipment, because that allows countries to say yes or no or whatever on the basis of domestic regulations. But there is no AIA procedure as such. There are documentation requirements that allow importing countries to identify what is in a ship and the extent of these documentation and identification requirements was, in the end, the most difficult problem to solve in the negotiations, because here you have the question of commodity segregation: how far can you go? So we had different regimes again for seeds, for contained use, research and for the commodities.

But there is also a provision saying that a detailed identification ought to be negotiated within the first three years after the Protocol comes into force. So that's one major problem to be resolved during the upcoming Conference of the Parties (COP) next year in Kuala Lumpur.

Major details still to be finalized

Important aspects are capacity-building, a compliant mechanism, which is planned and has to be set up, and a liability regime. There was no clear agreement as to what this should look like, it could not be negotiated in time, but there will be a process which we will initiate next year. Then two very fundamental issues: one is precaution, that's the first environment agreement where the precaution principle is being specifically defined. That happened at the very end in a two-hour negotiation where the EU managed to get through its perception of what precaution should mean, it was a bit of a compromise between what is at the moment in the WTO SPS regime which was defended by Japan and what was the original position of the developing countries. But it goes very far and it is probably also the issue which was the second biggest problem for the US and other exporting countries. But we have here a clear statement, also and specifically for seed and commodities. Countries do have a right to say "no" in a situation of scientific uncertainty or to ask for more time or for more information.

And in the second question, and linked to it, is the question of the relationship between the Protocol and other international agreements, i.e. the WTO. And there, ultimately, the main confrontation was between EU and the exporters – well, let's say the developing countries.

And thus that is to us to resolve. We had a strong position to say we do not want one international agreement to be subordinated to an other. We stressed the mutual supportedness of environment-related trade agreements. The developing countries went a bit further: they wanted the most specific environment agreement to take precedence over the WTO, and of course the exporters said the Protocol must be subordinated to the WTO. So it's a compromise.

A fair agreement

I think this agreement strikes a fair balance between trade, environmental and development interests. I think it enables responsible decision-making with the help of capacity-building and setting up of domestic frameworks. It has a very strong emphasis on cooperation and information-sharing between exporters and importing countries. It is based on the precaution principle, it facilitates capacity-building and it's a multilateral approach.

The main limitation is first of all that the US is not a party to the CBD or a signatory to the Protocol, nor have any of the major exporters yet ratified the Protocol. We expect Canada to ratify. I'm not quite sure what Argentina will do. Australia has not yet signed. So that's a bit of a problem. If none of the major exporters ratify then it will be difficult to turn this into a regime that works. We hope that it will be accepted by everybody. It is a good agreement and we hope that pressure will build up for the others to come in. We think it is a fair agreement and we hope that the US industry will also go along with the system, because it provides more credibility and a degree of legal security for them. As to the limitations: capacity-building still requires specific national legislation and capacities and we will have to see what will become the key framework for biotechnology. I hope so, it came into force in September as you know, but we need still more ratifications, there is much more work we have to do to make it operational and really at the same level as the WTO in terms of environmental balance and health, including socio-economic and trade concerns.

Jeffrey M. Smith

Politicians and Corporations – Birds of a Feather

On May 23, 2003, President Bush proposed an Initiative to End Hunger in Africa using genetically modified (GM) foods. He also blamed Europe's "unfounded, unscientific fears" of these foods for hindering efforts to end hunger. Bush was convinced that GM foods held the key to greater yields, expanded U.S. exports, and a better world. His rhetoric was not new. It had been passed down from president to president, and delivered to the American people through regular news reports and industry advertisements.

Part of a master plan

The message was part of a master plan that had been crafted by corporations determined to control the world's food supply. This was made clear at a biotech industry conference in January 1999, where a representative from Arthur Andersen Consulting Group explained how his company had helped Monsanto create that plan. First, they asked Monsanto what their ideal future looked like in fifteen to twenty years. Monsanto executives described a world with 100 percent of all commercial seeds genetically modified and patented. Andersen Consulting then worked backward from that goal. And developed the strategy and procedures needed to obtain a place of industry dominance in a world in which natural seeds were virtually extinct.

Integral to the plan was Monsanto's influence in government, whose role was to promote the technology worldwide and to help get the foods into the marketplace quickly, before resistance could get in the way. A biotech consultant later said, "The hope of the industry is that over time, the market is so flooded that there's nothing you can do about it. You just sort of surrender."

The anticipated pace of conquest was revealed by a conference speaker from another biotech company. He showed graphs projecting the year-by-year decrease of natural seeds, estimating that in five years, about 95 percent of all seeds would be genetically modified.

While some audience members were appalled at what they judged to be an arrogant and dangerous disrespect for nature, to the industry this was good business. Their attitude was illustrated in an excerpt from one of Monsanto's advertisements: "So you see, there really isn't much difference between foods made by Mother Nature and those made by man. What's artificial is the line drawn between them."

Unexpected resistance

To implement their strategy, the biotech companies needed to control the seeds – so they went on a buying spree, taking possession of about 23 percent of the world's seed companies. Monsanto did achieve the dominant position, capturing 91 percent of the GM food market. But the industry has not met their projections of converting the natural seed supply. Citizens around the world, who do not share the industry's conviction that these foods are safe or better, have *not* "just sort of surrendered."

Widespread resistance to GM foods has resulted in a global showdown. U.S. exports of genetically modified corn and soy are down, and hungry African nations won't even accept the crops as food aid. Monsanto is faltering financially and is desperate to open new markets. The U.S. government is convinced that the European Union's (EU) resistance is the primary obstacle and is determined to change that. On May 13, 2003, the U.S. filed a challenge with the World Trade Organization (WTO), charging that the EU's restrictive policy on GM food violates international agreements.

On the day the challenge was filed, U.S. Trade Representative Robert Zoellick blamed fears of GM foods on “special interests that hype hysteria.” He said, “millions of North Americans have been eating biotech food every day for years and not a single adverse health consequence has been documented.” Zoellick said, “the EU bears a responsibility for ensuring that its health and environmental policies have a sound scientific basis.” He added, “Sadly, as we’ve waited patiently for European leaders to step forward to deploy reason and science, the EU moratorium has sent a devastating signal to developing countries that stand to benefit most from innovative agricultural technologies.” The following week, President Bush claimed that the EU “blocks all new bio-crops because of unfounded, unscientific fears. … European governments should join – not hinder – the great cause of ending hunger in Africa.”

Pro-biotech rhetoric is on the rise as the U.S. attempts to force GM foods onto countries around the world. Major U.S. media repeat the government’s unsupported claims without question or analysis. The UK’s Prime Minister Tony Blair is similarly pushing the industry’s agenda. On June 18, 2003, he said, “it is important for the whole debate to be conducted on the basis of scientific evidence, not on the basis of prejudice.”

Data manipulation normal

But this open and frank debate is being obstructed, by the U.S. Government as well as by big business. The risks associated with the technology are being swept under the carpet – environmental and health hazards, such as the potential for cancer, toxins, new diseases, and the other health hazards related to rbGH and the L-tryptophan disaster. There are also the numerous ways in which industry researchers apparently doctored their studies to avoid finding problems with GM foods.

For example, Aventis heated StarLink corn four times longer than standard before testing for intact protein; Monsanto fed mature animals diets with only one-tenth of their protein derived from GM soy; researchers injected cows with one forty-seventh of the amount of rbGH before testing the level of hormone in the milk and pasteurized milk 120 times longer than normal to see if the hormone was destroyed; and Monsanto used stronger acid and more than 1,250 times the amount of a digestive enzyme recommended by international standards to prove how quickly their protein degraded. Cows that developed pathologic symptoms were dropped from Monsanto’s rbGH studies, while those that conceived before treatment were counted as support that the drug didn’t interfere with fertility; differences in composition between Roundup Ready soy and natural soy were omitted from a published paper; antibody reactions by rats fed rbGH were ignored by the FDA; deaths of rats fed the FlavrSavr tomato remain unexplained; and Aventis substituted protein derived by bacteria instead of testing protein taken from StarLink, among others.

A much longer list would be required to recount the conflicts of interests, including job switches between government and industry, targeted campaign contributions, and the reliance by scientists, universities, and research institutes on industry support.

One of the most dangerous aspects of genetic engineering of food is the consistent attempt to silence those with contrary evidence or concerns. The attempts by these and others to alert the public and scientific community to the dangers of GM foods have yielded significant results. The rapid expansion of GM foods envisioned by Monsanto and others has slowed to a crawl, as more and more of the world community refuses to accept the foods or the rhetoric.

Dr Christine von Weizsäcker, Germany

Ethical Considerations on Gene Technology for Food and Agriculture in the World Council of Churches

The existing small Working Group on Genetic Engineering of the World Council of Churches has members from many countries and churches around the world, e.g. Kenya, South Africa, South Pacific, Philippines, Brazil, USA, Canada, Scotland, Russia, Germany. There is a focus on theological contributions. And the WCC's work on "Caring for Life" is explicitly focusing on the weak and easily victimized partners in the debate. Since I, myself, come from a scientific background and have been a member of Working Groups on Biotechnology and of the Chamber on Development and Environment of the Protestant Church in Germany, my professional expertise and background give me more of a supportive than a central role in this working group, which I very willingly and humbly accepted. I will therefore refrain from using my presentation for my personal views on bioethics in food and agriculture. I will present an overview of the work in progress and add some quotations from this work that are fitting contributions within the context of today's conference.

Thirty years of genetic engineering

The World Council of Churches pioneered work on biotechnology and genetic engineering through initiatives of the Department on Church and Society during the seventies and eighties of the last century. This work culminated in a study document that was received by the Central Committee of the World Council of Churches, i.e. its main governing body, in 1989. Ecological and health impacts, the relevance of patents on life for rural communities were already discussed in this document. The additional urgency of ethical, anthropological and theological challenges posed by genetic engineering due to further rapid developments in science, on the one hand, and in public debate and national and multinational legal initiatives, on the other hand, created an urgent need for an updated statement and for an ecumenical platform for common discussion and engagement by churches.

In 1999 the Programme Committee of the Central Committee of the World Council of Churches drew the attention "to the spiritual dimensions of caring for life, particularly as these relate to ethical questions arising from biotechnology". The Advisory Group of the WCC's Justice, Peace, Creation Team took up this recommendation in 2000 and suggested work on agriculture and genetically modified foods as an entry point for a study process on genetic engineering that concentrates on underlying ehtical concerns and the vision of life. A small working group on genetic engineering discussed the proposal and produced a background document for last year's Central Committee Meeting. The debate on genetically modified crops and food aid became a major issue in 2003, following the rejection of gmo-corn as food aid by some Southern African Countries, e.g. Zambia. This concern is now taken up by Action of Churches Together (ACT), the Lutheran World Service (LWS) and the World Council of Churches. This year, the working group produced a small background document for the discussion on human applications of genetic technologies.

Discussion and learning from one another

The Programme Committee II of the Central Committee noted that there are significant gaps in the legal or regulatory frameworks, that there are grave concerns about military applications, that there are very powerful interests and an imbalanced distribution of resources, and that the understanding of the human being and its place in creation are at stake. I quote from the recommendations that were passed in this year's session:

1. That the WCC create a platform for exchange and discussion for the churches concerning issues related to genetic engineering.

2. That the WCC encourage member churches to engage with the issues at stake in listening to people working in the field, to those most affected, and to the witness by other churches.
3. That the WCC present a study document on genetic engineering building on the 1989 guidelines that takes note of the different theological and ethical approaches by different member churches, but also highlights common concerns and initiatives; the work on the study document should include representatives of people working in the field and of those most affected, e.g. Indigenous Peoples and people in the agricultural sector.
4. That the WCC bring these concerns to the next assembly in the framework of the churches' engagement with issues of science and technology.

The most palpable result of this WCC process consists in increased communication and discussion of church initiatives wordwide. The gap between the challenges posed by genetic engineering and patents on life and the active participation of civil society in the debate is noticeable. This applies even more to the voices of churches and faith communities. However, they increasingly learn more about each others' approaches and are encouraged to cooperate better at different levels.

Ethical considerations increasingly important

May I quote from Ecumenical News International of 3rd May 2003: "Ecumenical church and relief organizations have called for guidelines on the use of genetically engineered food in their emergency aid operations, says the Lutheran World Federation. A team of experts from the LWF, the World Council of Churches and Action by Churches Together (ACT), a humanitarian aid network – all with headquarters in Geneva – is being set up to address food safety, justice and theological issues arising from the use of modified food in countries facing famine and other emergencies.

Concerns and statements by member churches, but also by civil society groups are being widely circulated. Out of the many communications let me just mention a few examples:

- The theological affirmations which ground United Methodist policy on the issue of genetics
- The Final Statement which resulted from a Bioethics consultation in the Pacific in 2001 focusing on resistance against biopiracy, patents on life and biosafety.
- The result of independent studies on GMO contamination in the center of genetic diversity of maize in Mexico and the call for a moratorium on GMO releases in such centres of critical food crops.
- The Protestant/Catholic Joint Position Paper from the Commissioners for Environmental Questions in the Protestant Regional Churches in Germany, the Commissioners for Environmental Questions in the Roman Catholic Dioceses of Germany, the Protestant Services for Rural Mission and the Catholic Rural People's Movement called "Questions not solved – promises not kept. Ten arguments against the use of genetically modified plants in food and agriculture", which is available at this conference.
- The Response of the Interchurch Commission on Genetic Engineering (ICC) to the Report of the Royal Commission on Genetic Modification in New Zealand.

The WCC work is based on the assumption that a technology which often consists in unilinear technological end-of-the-pipe-fixes should not be accompanied by equally unilinear ethical end-of-the-pipe-fixes. Ethical considerations have to start further upstream, including cultural, socio-economic, but also technological alternatives, branch out into the experiences, values and contributions of all people concerned, and also have a look downstream into the consequences for those far away in space and time. Spiritual wisdom and cultural

experience taught communities that they can speed up life-saving learning processes by listening to the voices of their most vulnerable, victimized and neglected members.

“Science and technology are no neutral tools”

Let me sum up some of the discussions which led to the background document “Caring for Life: Biotechnology and Agriculture” prepared last year by the small working group on genetic engineering for the Policy Reference Committee II of the World Council of Churches’ Central Committee. There were considerations on the relationship of food, spirituality and politics and theological reflections on “Our Daily Bread”. There were lines of arguments which show that science and technology are no neutral tools, but are linked to power and the promotion of a reductionist word-view. Risks to biodiversity, human health, and social and economic well-being were discussed, with special attention to the Cartagena Protocol on Biosafety and the UN Convention on Biological Diversiy. There were strong indications that inequality and food insecurity are fostered by a combination of gene technology with recent trade and IPR agreements. We spent some effort on differentiation and describing the backgrounds, interests and influences of major actors, like farmers and social movements, indigenous peoples, scientists, transnational corporations and financial markets, governments and politicians, consumers. An underlying theme was the fact that there are alternatives and other ways are possible: Let me conclude with some quotations that you may consider useful:

- “If the assumptions of genetic engineering, its cultural genesis and its programme are put to the test and carefully examined, it may become clear that we are confronted with a point of divergence where we must carefully choose between profoundly different trajectories of history, caring for life, for diversity and just and sustainable relationships.”
- “Assuming that Creation is abundant, and that there is sufficient for all, but not enough for accumulation and concentration, a culture of sharing and solidarity becomes the more important and more promising project, which resonates with the paradigms of Manna and the Eucharist as powerful Biblical symbols for it.”
- “Opposing an oppressive and utilitarian attitude toward Creation there is an alternative horizontal model, not based on the supremacy of a single species and class, but on complexity and diversity. Every organism, every plant and animal, has a place and a function, however limited. Mutuality and interdependence are characteristics of this horizontal cosmology, which resonates so much with the Biblical witness and the teachings of the early church.”
- “Food aid becomes a means to compensate economically for consumer rejection of genetically modified food and prevent the prices from falling.”
- “To counter fatalism and injustice, there is a tradition in many cultures of conscientious objection. It can be a redefiniton of power, even a redefinition of language and meaning, ‘problems’ and ‘solutions’.”