# Socio-economic impact of GMOs on African consumers

Book Chapter

# Genetic Engineering and Food Sovereignty

## Sustainable Agriculture is the *Only* Option to Feed the World

Reader on Studies and Experiences

Threats by GM-Agriculture,
Ways towards Sustainable Agriculture and
Lobbying Work in Developing Countries

by EED and Partners

Evangelischer Entwicklungsdienst

Church Development Service EED
Bonn/Germany, 2009

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**April 2009**

Claudia Warning,
Wilfried Steen,
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# Preface

## Genetic Engineering is not an Alternative to Sustainable Agriculture for Feeding the World

In connection with the work of the EED in the global south, we have collected the experiences of partners and EED professionals seconded by EED overseas, and looked into the question of whether or not genetic engineering is necessary in agriculture and nutrition, in order to fight rural poverty and hunger.

During the past year, the global crisis of increased food prices has played a big role in world politics. Most of the schemes to overcome the crisis were about removing 'supply-side constraints' (restrictions on the supply side) to encourage agriculture worldwide and increase production. The majority of political declarations, as for example the decisions of the G8 in the summer of 2008, proclaim a 'New Green Revolution for Africa.' This is essentially a revival of a modernisation approach that was so successful in the 1970s and 1980s, but failed miserably, even in those days, in Africa.

Today in Asia and Latin America we are faced with the ecological consequences of intensive farming that paid little respect to the environment or society. The Green Revolution is concerned with introducing small farmers to modern industrial inputs, for example, the use of inorganic fertilisers, pesticides and high-yield seeds. Yet, there is nothing to indicate that this approach in Africa functions any better now, than it did 30 years ago. How can we take account of the negative experiences in Asia? Even the new farming technologies – and the G8 are referring here to new types of biotechnology – are not making a major difference in this respect. The approach is false, because factors related to the local environment are ignored: humans and their culture and society, soil types, climate, natural plant communities, the interplay of beneficial insects and pests, and other location-specific conditions. In addition, genetic engineering is full of risks and is also very expensive. Therefore, varieties have to be developed, which can find wide distribution in order to recoup the high development costs. This runs counter to the knowledge that there can be no quick fixes in agriculture, that the way forward must be location-specific.

The case studies of our practical development work, presented in this Reader, document some of the problems with rural development if it relies too much on genetic engineering. The experiences also show that this genetic engineering has not only been pretty ineffective thus far, but actually puts other forms of agriculture, especially agro-ecological approaches, at risk.

Genetic engineering is no alternative to an agro-ecological approach, which is shaped by principles of diversity and improved with the involvement of local farmers. The agro-ecological, participatory approach not only promises better yields together with improved environmental conditions, but also its distribution effect is more advantageous- it is of direct benefit to poor, peasant farmers.

Most of the articles in this volume arise from a four-year, joint work project coordinated by the EED, in which 18 partners from all continents and from all departments in the EED were involved. This programme formed a mutual exchange among all participants, not just a new relationship with our partners, but also a new South-South dialogue among our partners. Its theme focused not only on the use of agro-ecological methods, but also on the influence that national legislation can exert on programmes related to genetic engineering. The programme also involved joint lobbying at the international level on questions of bio-safety and sustainable agriculture. We look back on this complex, but ultimately, rich learning process, with gratitude. Our special thanks go to our overseas partners, who proved to us that development policy is no longer a one-way street. This process of mutual learning must continue!

For the EED:
Claudia Warning and Wilfried Steen,

Directors

Rudolf Buntzel,
EED

# Background

## EED's Advocacy of Sustainable Agricultural Practices

For the past four years, the Church Development Service EED has run a special Joint Advocacy Project with eighteen partners from the Global South and all departments in the EED. Together, we focused on the topic '**Genetic Engineering – a Threat to Food Sovereignty**.' Seven of the participating organisations came from Africa, six from Asia, two from Latin America and two were international organisations. All are closely connected with the EED, and receive EED financial support. All the organisations are committed to sustainable agriculture. Most of them do practical work in the field, and do work with farmers and farm groups. All of them actively lobby and carry out advocacy activities in their countries to influence legislation, or political programmes affecting sustainable agriculture. Some have lobbied at the international level- at the FAO, CBD or other UN organisations.

We came together, in unison in our common concern with regard to the serious problems posed by genetic engineering to food and agriculture, and the fundamental challenges posed to agro-ecological approaches. Together, we formulated a common platform for our joint advocacy programme, which came to be known as the 'Bonn Declaration' (see Appendix).

For the EED, this project was a thrilling, new experience. For the first time we were engaged in a political exercise in a truly ´integrated´ way. ´Integrated´ in the sense that all departments of the EED cooperated closely (through a joint Steering Group), that the partners and the EED came together in a political initiative, and finally that the partners from different continents also joined forces. There were additionally other aspects of integration: Integrating practical experiences with activities around national lobbying, integrating national and international lobbying and integrating different forms of activities- political analysis, investigation, study and research, educational activities, publications, lobbying activities, and international exchange programmes, with a common objective.

This reader brings together summaries of analysis and descriptions of interventions by some of the participating partner organisations. They do not cover everything that was done under the joint project. Two articles, added from other EED-related activities; which although outside the Joint Advocacy Project, are closely related to the subject of GMOs (Genetically Modified Organisms) and food sovereignty.

Some conclusions that can be drawn from this project are:

- It is worthwhile to involve people working in the field, at the grassroots level, to participate in international lobbying activities. This is true for two major reasons: First, they bring new dimensions to the highly sophisticated technical and legal debates of experts. Secondly, their participation provides them with an opportunity to understand how international politics operates, and possibly impacts local issues.
- The exchange of experiences of grassroots work, at a global level– especially south-south exchanges, can greatly increase mutual understanding and lead to higher levels of confidence and conviction among participants. It was amazing to discover the similarity in the basic problems of all the participating organisations and farmers of their regions, and the similar difficulties they face with the political processes concerning the legal and illegal introduction of GMOs.
- There is a huge capacity for mutual learning when highly professional lobbyists act together with local activists.

The biggest agro-ecological challenge related to the introduction of GMOs comes from the problem of cross-pollination and the undesirable alteration of plants in farmer's fields. The first part of this reader documents some of the experiences we have collated and shared, regarding the issue of such contamination. We did not try and embark on an exercise to develop something similar to Greenpeace's Contamination Register, which makes a bold attempt to list as many well-documented cases around the world as possible (see Appendix). The Contamination Register is an admirable and important piece of work. We were content with collecting some case studies by ourselves.

The second part of the reader deals with some special problems connected with the introduction of GMOs into developing countries and the issues and lobbying activities that we were involved with globally, concerning the Cartagena Protocol.

The third part emphasises aspects related to the defence of agricultural development models that we champion against the threat posed by the introduction of GMOs. The practical experiences documented show that GMOs are not needed to combat hunger and poverty in rural areas of developing countries. Instead we are practicing our own authentic models of agriculture, which are equally effective, and yet, devoid of the attendant risks and dependencies of GM technology. Our models can solve many problems at the same time: the social stratification that goes along with innovations, concerns of environmental sustainability, meeting basic needs and the issue of unemployment.

Location-specific, agro-ecological approaches to development are not alternatives to GM agriculture, and GMOs are not an alternative to organic agriculture, which is the most natural model of progress.

Rudolf Buntzel

Bonn, 2009-April-09

# Sustainable Agriculture without Genetic Engineering

Lim Li Ching,
Third World
Network

## Introduction

Genetically engineered (GE) crops were estimated to cover an area of 114.3 million hectares, or 282.4 million acres, globally, in 2007 (James, 2008). GE crops are limited in their distribution, and have largely bypassed all, but a few developing countries (Falcon and Fowler, 2002), with approximately 97.3% of global GE crop area confined to just five countries.

In 2007, the US was the principal adopter of GE crops globally, with 57.7 million hectares (50% of global GE crop area), followed by Argentina (19.1%), Brazil (15%), Canada (7%) and India (6.2%) (James, 2008). Moreover, commercially available GE crops have been almost exclusively limited to soybean, maize, cotton and canola, and to two GE traits – herbicide tolerance and insect resistance.

While GE crops are still concentrated in a handful of countries, there has been an increasing pressure on many other countries to adopt GE crops. The rapid development and expansion of genetic engineering in agriculture would, however, carry a wide range of potential risks to the environment, health and socio-economic conditions of farmers, indigenous peoples and local communities.

With the pressure to adopt GE crops, agriculture is thus currently facing a major choice - on which technology should the future of world agriculture be based? The dominant model is one based on industrial monoculture, high chemical inputs; and increasingly, use of GE crops.

Yet, sustainable agriculture and organic farming are not only better for the environment, but are also beneficial for productivity and farmer's incomes. In 2005, there were more than 26 million hectares of farmland under organic management worldwide (Willer, H. and Minou Yussefi 2005), and the growth in the global organic market has been about 15 per cent annually, over the past decade.

While organic farming excludes the use of genetically modified organisms (GMOs), there is still a danger of contamination by transgenes occurring, via gene flow, spillage during transport, seed storage and exchange, and co-mingling of bulk shipments. Thus, the risks posed by GE crops are very real for organic farmers.

# Biosafety Concerns

## *Environmental Risks*

Environmental concerns about GE crops include gene flow (both via cross-pollination and horizontal gene transfer), the impact on biodiversity and non-target organisms, the potential development of 'weediness' traits in wild and weedy relatives and lastly, the risk of insect resistance.

Hybrids of GE crops and their wild relatives could swamp populations of wild species, possibly leading to their extinction and impacting agro-biodiversity, especially in centres of origin and diversity. Crop genetic diversity is important for food security, acting as a reservoir for future breeding efforts. Already, traditional varieties of maize in Mexico; a centre of origin and diversity of maize, have been contaminated by transgenes (CEC 2004, Pineyro-Nelson et al. 2008, Quist and Chapela 2001).

GE crops could impact non-target organisms (that are not direct targets of pest control), including beneficial species like natural enemies of pests (e.g. lacewings) and pollinators. There is also little research on ecological consequences; as ecosystems are complex, impact on one organism could have significant impacts elsewhere in the ecosystem (Snow et al. 2004). Effects on soil biodiversity have also not been adequately assessed, although there are some indications that soil microorganisms could be negatively impacted (Turrini et al. 2008).

Widespread adoption of herbicide tolerant GE crops could lead to problems in the long-term. In the US, where GE crops have been planted commercially since 1996, pesticide use has increased overall (Benbrook 2004), and on the whole, the presence of GE crops in the market has caused an increase, rather than a decrease in use of toxic pesticides (FOEI 2008). This is primarily due to an increase in herbicide usage, largely because there has been a shift towards a rise in more herbicide tolerant weed species, or the development of weeds resistant to herbicides, particularly glyphosate.

Some herbicide tolerant crops (GE oilseed, rape and beet) have significant effects on biodiversity (FSE 2003). Weed densities and biomass, and presence of some invertebrates, were found to be lower in GE crops than in conventional controls.

Insects may eventually evolve resistance to insect resistant GE crops. If this happens, GE crops will no longer be effective at controlling insect pests and more harmful insecticides would have to be used instead. It is widely assumed that resistance to insect resistant Bt crops will occur (Snow et al. 2004).

### *Health Risks*

Some of the key concerns, in relation to potential health risks of GE crops, include the toxicity and allergenicity of transgenic products, the fate and persistence of transgenic DNA, rearrangements of transgenic inserts compared to notified sequences, the use of antibiotic resistance marker genes, and the potential for horizontal gene transfer of transgenic DNA into gut bacteria.

However, questions about the safety of GE crops for human and animal consumption have yet to be answered adequately. There is still no scientific consensus on the safety of GE crops, due to the lack of an adequate database on which to base decisions (Domingo 2000, Domingo 2007).

The few studies that have been designed to reveal physiological or pathological differences, demonstrate a worrying trend (Pryme and Lembcke 2003). Studies conducted by industry find no differences, while studies by independent researchers (e.g. Bøhn et al. 2008, Ewen and Pusztai 1999, Fares and El-Sayed 1998, Finamore et al. 2008, Pusztai et al. 2003, Malatesta et al. 2002, Velimirov 2008) show an adverse impact of GE crops or food that merit follow-up.

In addition, GE crops developed to produce pharmaceutical compounds pose very serious risks (UCS 2004). They are intended for use by drug companies or in industrial processes, and not for consumption. The compounds are often biologically active chemicals and are potentially toxic. Pharmaceutical production should not be conducted in food crops because of the high risk of contamination via gene flow, grain admixture or human error.

### *Socio-economic Considerations*

The control of patented GE crops is one of the key socio-economic concerns. Patented GE crops, owned by corporations, would take control out of the hands of local farming communities. The use of patents for transgenes may drive up costs, restrict experimentation by the individual farmer or public researcher, while also potentially undermining local practices that enhance food security and economic sustainability (IAASTD 2008). In this regard, there is also particular concern about current intellectual property rights instruments eventually inhibiting a farmer's rights to saving seeds, their exchange and sale, and access to proprietary materials necessary for the independent research community to conduct analyses and long term experimentation on the impacts of GE crops (CIPR 2002, IAASTD 2008).

Should patented GE crops contaminate non-GE and organic crops, the implications for farmers who traditionally save and exchange seeds could result in liabilities for these farmers. Contamination of non-GE and organic crops could also jeopardize people's right to choose non-GE crops and food stuffs and could affect local and export markets.

Many crops are much more than vital food crops. They are culturally, religiously and socially embedded in many societies. These practices embody an agri-*culture*, intricately linking crop production with religion, culture and social relations. The potential contamination of traditional varieties with transgenes poses serious concerns to local communities and indigenous peoples.

## Benefits of Sustainable Agriculture

In contrast, sustainable agricultural practices, which include organic farming, are viable alternatives that offer many benefits to the environment, biodiversity, local livelihoods, and human health (IAASTD 2008).

The viability and productivity of sustainable agriculture has been demonstrated in a review of 286 projects in 57 countries, where farmers were found to have increased agricultural productivity by an average of 79%, by adopting 'resource-conserving' or sustainable agriculture practices (Pretty *et al*. 2006). A variety of resource conserving technologies and practices were used, including integrated pest management, integrated nutrient management, conservation tillage, agro-forestry, water harvesting in dryland areas, and livestock and aquaculture integration into farming systems. These practices not only increased yields, but also reduced adverse effects on the environment and contributed to important environmental goods and services (e.g., climate change mitigation), as evidenced by increased water use efficiency and carbon sequestration, and reduced pesticide use.

The work built on earlier research, which assessed 208 sustainable agriculture projects. The earlier research found that for 89 projects, for which there was reliable yield data, farmers had, by adopting sustainable agriculture practices, achieved substantial increases in per hectare food production. The yield increases were 50-100% for rain-fed crops, though considerably greater in a number of cases, and 5-10% for irrigated crops (Pretty and Hine 2001). There is also evidence that sustainable agriculture and organic farming provide yield stability by minimizing long term yield volatility due to adverse climactic occurrences i.e. drought, torrential rain, windstorms.

A recent study examined a global dataset of 293 examples and estimated the average yield ratio (organic: non-organic) of different food categories for the developed and developing world (Badgley *et al.* 2007). On average, in developed countries, organic systems yield 92% of the yields produced by conventional agriculture. In developing countries, however, organic systems produce 80% more than conventional farms.

Other environmental benefits of sustainable agriculture include increased soil fertility, reduction of external energy consumption and water requirements, improved pest and disease control, and effective optimization of resources (see ISP 2003 for a summary). In addition, sustainable agriculture and organic farming involve diverse crops, which can provide better nutrition, and reduce the risk of dependence on one crop. This diversity through crop rotation, intercropping and polyculture tends to lower the risk of heavy pest and disease-related losses while improving fertility. Intercropping and cover crops reduce erosion, improve moisture levels, reduce the need for weeding, and provide fodder and additional sources of income.

The health benefits of sustainable agriculture and organic farming derive largely from the non-use of toxic pesticides and chemicals, and the added nutritional diversity offered by multiple and integrated farming, by livestock and other farm animals. There is also some preliminary evidence of improved nutritional qualities in organic food.

In January 2005, the International Fund for Agriculture Development (IFAD) published a report based on studies in China and India, which showed that farmers who switched to organic agriculture achieved higher earnings and a better standard of living (IFAD 2005). In China and India, organic production is growing steadily. The value of Chinese exports grew from less than US$ 1 million in the mid-1990s to about US$ 142 million in 2003, with more than 1,000 companies and farms certified. In India, there has also been remarkable growth, with about 2.5 million hectares under organic farming and 332 new certifications issued during 2004. Its 2003 organic exports were officially estimated at US$ 15.5 million.

The value of organic agriculture does not just come from the fact that it can provide higher incomes, but that it can potentially contribute to long-term resilience and stability, particularly with respect to resource conservation, crop diversification, and food security.

Similar findings were shown by a study conducted in 2001 in six Latin American countries (IFAD 2003). IFAD concluded that organic food production could promise a way out of poverty for many small farmers in developing countries. However, organic agriculture should not be considered a panacea to reduce poverty in any environment, at any time. Nonetheless, in areas where conditions favour the adoption of organic agriculture by small farmers, it can provide a long-term solution to poverty, while reducing migration, and improving health conditions and the environment for communities.

Furthermore, sustainable agriculture and organic farming are knowledge intensive rather than capital and resource intensive, and allow for the integration of traditional knowledge, farmer and community development, thus improving social capital (Pretty and Hine 2001).

A concrete example of organic farming in practice comes from Tigray, north Ethiopia. There, through a project supported by Third World Network, a package of sustainable agriculture practices including composting, have led to increased yields (as compared to using chemical fertilizers) for resource poor farmers living on extremely degraded lands (Araya and Edwards 2006, Edwards 2004, Edwards *et al.* 2008).

## Conclusion

There is a strong case for GE-free agriculture, given the many risks genetic engineering poses to agriculture. In addition, experiences worldwide show that sustainable agriculture, organic farming and agroecology are viable alternatives that can bring real benefits to local farmers and communities.

However, it is crucial that the appropriate policy shifts and research occurs to support these alternatives, as so far, organic farming has been largely marginalised. Priority support should be given to research and projects on ecological and community-based farming practices, as so far, the bulk of funding has been increasingly directed to biotechnology and genetic engineering.

Studies should be conducted to understand the many types of low-input, ecological, farming methods - traditional as well as modern. They should recommend methods for solving any problems encountered in practice (such as manure shortages, pest control and water management).

In order to enable greater scientific understanding of sustainable agriculture and a paradigm shift in policy, agricultural aid should flow towards the following: (see Khor 2003c):

(a) Reassessing the concept and measurement of productivity, duly recognising the value of traditional, ecological farming methods and enabling a scientific comparison with Green Revolution methods;
(b) Studying sustainable agriculture systems, their operations and dynamic inter-relationships, their problems and solutions to these problems;
(c) Sustainable agriculture experiments, test farms and demonstration farms;
(d) Training programmes for farmers, policy and extension officials, and NGOs;
(e) Supporting farmer's programmes and government programmes in implementing sustainable agriculture, which could eventually take place on a large scale;
(f) Supporting farmers, community groups and governments in establishing community-based seed networks to revive and promote the use of traditional varieties, and supporting the exchange of seeds and the improvement of varieties using appropriate traditional breeding.

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Theological Reflections by Rev. Marcus Harke

# Did Noah have any Choice?

In the Jewish and Christian tradition there is that wonderful story of Noah's Ark. God sends a great flood to destroy the earth because of humankind's wickedness. As far back as about 3,800 years ago, this story was already known in Babylon.

Anyway, it's all about a new beginning. So Noah is commanded to build a giant ship, the Ark. Its purpose is not just to provide shelter to Noah's family, but also to the entire animal world. The Bible tells us that *"Noah was a righteous man, blameless among the people of his time; he walked with God."*

And further on: *"Gen. 6.18 I want to establish my covenant with you, and you shall go into the ark with your sons, your wife and your sons' wives. 19 And of every living thing of all flesh you shall bring two of every sort into the ark, to keep them alive with you; they shall be male and female. 21 Also take with you every sort of food that is eaten and store it up; and it shall serve as food for you and for them."*

Noah follows the instructions and survives – as do all the animals on board: *"Every beast according to its kind, and all the cattle according to their kinds, and every creeping thing that creeps on the earth according to its kind, and every bird according to its kind, every bird of every sort; 15 They went into the ark with Noah, two and two of all flesh in which there was the breath of life."* While the floods destroy everything during the forty days in which they hold sway, the ark rises and floats on the waters. When the waters abate, the ark comes to rest on Mount Ararat.

For me, the image of Noah's Ark is one of the greatest symbols of hope for humanity: a community living together, protected from the floods engulfing them, bringing them out of the chaos. Man and beast, all in one boat, a temporary Utopian home for the survivors. The ark becomes the pledge for an imaginary way of life: peace between man and beast, united by the common will to survive. The community sharing the same space becomes the nucleus of future life, full of novel opportunities.

Yet, the other side to the story should not be ignored. Ultimately, the ark simply housed an organisation living in a confined space during an emergency, an organisation fleeing destruction. And in it were sheltered not only the shoots of a new world, but, as before, the genes of the old world – the seeds of evil.

Many comparisons come to mind. Wasn't it always like this? When Robinson Crusoe was saved, he built the same European patriarchal world from the ruins of his ship, treating the native, Friday, as his slave. And those who fled Europe because of religious persecution, which was often bloody, ended up repeating the same on the new continent of America, the New World, causing terrible bloodbaths among the indigenous people. Taking with them the seeds of hope for a new world, people also sow the seeds of the old – and as if out of spite, the old world raises its ugly head in the new world. The Ark, the Mayflower, both lie rotting on the shore. Even God appears resigned: "The thoughts and endeavours of man's heart is" – *and, one could add, still is* - "evil from his youth." (8. 21)

But there is a much more far-reaching comparison here: If you have ever looked, even briefly, at images of earth from space, it looks like a thin nutshell in the middle of an infinite ocean of nothingness, deathly emptiness, of chaos. Earlier, the view of earth from space was always the epitome of the invisible. The earth was what we were standing on, not something seen from afar. It was taken for granted and unlimited. Now, it supports life in the midst of the elemental forces of nothingness, and is thus constantly in danger of dissolving in it. The earth itself seems to have become the ark – travelling through the sea of time, with the course set on the promise of a new world in God.

Of course the risks seem to be increasing all the time. The journey could end before it reaches the shore. And that is not just because the supplies are being plundered, or the sundeck is still reserved for first class passengers, or because the crew are at each other's throats. Even the journey's goal has long disappeared from view. The destination that most of us see ahead is simply death. Just being on board is seen as the goal. For me, the flood means a new direction in life, in which the soullessness of our time finds expression. The feeling that one will never arrive, wears down the courage and strength of the crew. Odysseus knew all about that, and so did Moses and Joshua.

Of course the story of Noah seems simple: the compass is set for survival, and they do survive. Two qualities that the captain possesses to become a saviour of life: his uprightness before God and his technical skills in constructing the ark. God's word is like his bible, not just showing him the way ahead, but also explaining what is required. Noah must also follow His instructions to the letter.

Had I been consulted, I would have thought of a whole lot of animals that I would rather have left to the mercy of the flood. What purpose do crocodiles, or the tick, or even the tsetse fly have? What about the HIV virus? "Lord, in wisdom have you made them all," the psalmist praises the variety, the richness of creation, how everything fits together so perfectly. This order is not subject to any analysis.

Every living creature is made by God. So it is natural that in this beautiful image of the ark: *"every beast according to its kind, and all the cattle according to their kinds, and every creeping thing that creeps on the earth according to its kind, and every bird according to its kind, every bird of every sort"* – finds shelter with this person, Noah, because it has shelter in God.

No questions are asked here about usefulness or purpose, there remains a respect for uniqueness and beauty. Yet, as long as science and faith are linked together, we know, ugliness and plague know no boundaries. It is only later that everything falls asunder again, scientific knowledge and the piety of all theology.

Now, there is a growing realisation that a new alliance of scientific and religious thinking is required, particularly in these times of increasing ecological problems and unpredictable catastrophes. In Babylonian mythology, which has an identical story, Noah is called *Utnaphistim*, meaning 'the exceedingly wise one.' Should we research and find a rational explanation for everything come Hell or high water? Or, could the story of the flood also not point to the fact that while there are causes that are worth researching and following, there are also areas that we should leave well alone; where the less we know the better? Couldn't Noah also be a model and signpost for a new community of science and faith?

People, in their journey of life, have taken comfort from this story of Noah. God remembered Noah – humanity will not be destroyed, people will not be destroyed, we will not be destroyed. Even though it is not exactly a happy ending – just a new take on the old world – the story does contain a more fundamental message. What has really changed is explained by Luther in one sentence: "Now God began to be different." He is no immovable lump of rock, who insists on His rights, He is changeable.

No longer the one who seeks an eye for an eye, a tooth for a tooth, who repays humankind's eradicable rebelliousness with oppressive obliteration, but the merciful God, who shows regret for His own actions and promises never again to destroy creation because of the incorrigibly indulgent Adam. *"While the earth remains, seedtime and harvest, cold and heat, summer and winter, day and night, shall not cease" (Gen 8. 22)*

The rainbow still reminds us today of a sign of hope.

But there is yet another symbol alongside the ark- the dove comes back a second time with an olive branch. Then it flies away until it can no longer be seen by the eyes of the hopeful. The story of the end of the flood, tells us nothing about where the dove finally landed. In fact, it has not reached its destination yet, for it flies through the history of humankind and tortured creation dominated by wars and cruelties as a symbol of longing for a new country. It flew over the waters of Jordan when Jesus was being baptised. It hovered over Mary, and we see it over the disciples in the Pentecostal pictures. This band of disciples; the founding form of the church-to-be, will very soon be seen sitting in a boat, bursting onto the stormy sea of world history...

Whenever it’s a question of life and death, the dove appears– as a spiritual dove, a dove of peace. And it still flies today; in millions, not only on posters and stickers, but also as a sign that God’s spirit has moved humans and wishes to lead them from death into life, to new shores: God of love and patience, who wants us to make room for Him in our hearts – so that we may be guided by Him.

Amen

# Part 1

## What we have Learnt- Experiences with GMO Crops in Developing Countries

# 1.1 Transgenic Contamination of Soy in Brazil: Who pays the bill?

*Gabriel Bianconi Fernandes*

Soybean started to be grown in Brazil in the 1960s as a crop rotation alternative, with a view to facilitate wheat production on small and medium-sized farms, in the country's South. The area under this legume has risen from less than 7 million hectares in the mid-1970s, to over 20 million hectares at present. Production quintupled, from 12 million tons to 60 million tons. Productivity has risen by some 60%, from 1.7 to 2.8 tons/ha. All this increase would not have been possible without strong government investment in terms of research, credit, tax incentives, as well as infrastructure investments for the haulage of the grains from the production zones to the ports, for shipping to external markets- mainly in Europe.

Over the past ten years, Brazil has been exporting on an average 12.4 million tons of extracted soybean meal, and more than 18.8 million tons of soybeans per year. These deliveries are mainly destined to supply animal feed to intensive livestock farms in European countries.

With the advance of soybean farming in the central region of the country, today less than 20% of the original Cerrado formation remains- a biome regarded as the richest biodiversity savanna on the planet. The soybean farms advancing towards the North of the country, are pushing open the grasslands up to the Amazonic biome, and are so one of the main causes of forest clearing or deforestation.

The cost and damage caused by the erosion and degradation of soils, forest clearance, silting of water-courses, contamination of ground-water layers, land ownership concentration and displacement of local populations remain invisible to the eyes of economic calculation.

Even now, when transgenic soybean has been grown in Brazil for almost 10 years, it is difficult to know exactly its percentage in relation to the conventional non-transgenic grain.

For the 2008-09 harvest, the farm extension services are hinting, for the first time, at a decrease in the area grown to 'Soybean Roundup Ready' (RR), which is currently estimated to account for 59% of the total growing area.

The producers indicate three major reasons for the reversal:

- The first one is linked to the production costs. For the current harvest, Monsanto raised the amount of the fee payable for the use of patented seeds, by 17%. In addition, the price of the herbicide Glyphosate is 40% more expensive. In Brazil, Monsanto and Nortox hold the monopoly over the production of this herbicide.
- The second factor is related with the lower productivity of transgenic soybean, which so far has been compensated by the low prices of the inputs involved with this technology packet. Now, the fact that 'Soybean RR' yields have dropped by about 3 bags (180 kg) per hectare, as reported by some specialist extension firms is beginning to pinch the pockets of the producers.
- Thirdly, the preference of the European market and its readiness to pay a premium for non-transgenic soybean has been a major factor behind the decision by producers to look at alternatives. If the premium actually reaches the producers and is not pocketed by the oligopoly of the *traders*, the acceptance of the non-transgenic soybean would certainly be much greater.

From 1995; when the first law on biosafety was approved, up to 2007 only two transgenic varieties were released in Brazil: 'Soybean Roundup Ready,' and the cotton variety 'Bt Bollgard.' Both belong to Monsanto and were approved following their illegal introduction and cultivation in the country. In 2008 however, six transgenic varieties of maize and three cotton varieties were released- all for commercial planting. Waiting on the side-lines are such varieties of rice, eucalyptus and sugar-cane.

Brazil is one of the centres of origin of cotton, and of the genetic diversity of maize. This great diversity of local varieties now faces an imminent threat of contamination. These seeds of local varieties play an important role in promoting agro-ecology and in strengthening the food security of farm families.

The rules governing co-existence [in reality, isolation of crops] defined by the 'Comissão Técnica Nacional de Biossegurança' (National Technical Commission on Biosafety – CTNBio) for maize are absolutely irrelevant and will open up the possibility of an immense contamination of the genetic richness being maintained by the farmers in the countryside (100 m or 20 m plus 10 rows of non-GM maize). This scenario, forecast for maize, is already a reality in the case of soybean.

## *The Soybean Contamination*

One of the arguments, mostly raised to belittle the problem of contamination in case of soybean, is based on the fact that the crop's reproduction happens predominantly by self-fertilization, i.e. with little involvement of external agents like insects or wind, as it happens, for example, in case of cotton and maize. CTNBio has not defined any measure of co-existence for transgenic soybean.

A standard of co-existence must necessarily take into account all potential sources and agents of contamination, if it has to be effective. By sources we mean experimental fields, commercially grown crops, volunteer plants, *in-situ* seed banks, contaminated plants, agricultural machinery, trucks and storage facilities; and by agents we mean, wind, insects, birds, other animals, man, water-courses, agricultural machinery and trucks.

As is now well known, transgenic soybean entered Brazil mainly through seeds smuggled from neighbouring Argentina, which, in 1996, had approved commercial cultivation of the genetically modified variety of soybean. Extensive areas -more than 90 ha, were authorized under the pretext of experimentation, but the truth is that they were functioning as seed-multiplication fields, years before the approval of that variety.

CTNBio has been criticised for the lack of criteria for the approval of experimental fields and had been often asked for the same. This criticism stems from the fact that there was no limit fixed for the size of those fields. The criticism did produce some effect, but this is far from sufficient.

In the following portion we shall illustrate, using three concrete cases, how the contamination is affecting the daily life of farmers who using the organic and conventional routes, and who do not want to plant transgenic crops. Those cases were systematised in Paraná by AS-PTA and 'Terra de Direitos,' in partnership with the local organization of the family farmers, 'Central de Associações da Agropecuária Familiar do Oeste do Paraná' (CAOPA).

### *Contamination of Organic Production at Medianeira-PR*

Ademir and Vilma Ferronato live at Medianeira, in the western region of Paraná, where they grow organic crops on 16 hectares of land. In addition to the production of soybean and maize for the market, the couple owns quite a diversified holding with a garden, farm animals and fruit trees, which provide them a healthy and varied diet, everything being produced naturally with ecologically safe practices. However, their neighbourhood has predominantly conventional farmers, or those growing transgenic soybean.

During the 2006-07 harvest the couple was surprised when part of their production of organic soybean was rejected by 'Gebana,' the company marketing organic products, to which the family sold its produce. The tests revealed the presence of transgenic soybean seeds in the organic seeds grown by Mr. Ademir and Ms. Vilma. The seeds had been delivered by the same company, Gebana, which tests all lots of seeds before distributing them to the producers. The analysis of the seeds of soybean variety used -'BRS 232,' were negative with regard to transgenic pollution.

For Ademir and Vilma, the contamination occurred at harvest time. They reported that the 2006 soybean planting had been done in two stages to allow for hand-weeding. The first soybean lot was harvested from an area of approximately 7 hectares. It was tested, certified to be organic, and sold thus organic. The second plot, a little more than 4 hectares, was the one which revealed the presence of transgenic soybean.

The harvesting in this second plot was done using machinery that had been used earlier in farms where transgenic soybean had been sown. The harvester was cleaned in line with the instructions of the certification company, but apparently, this was not sufficient to avoid contamination.

The damage was unavoidable. From the first field, 280 bags were harvested and sold at R$ 40.00 each. The 140 bags harvested from the remaining four hectares were sold at R$ 28.50 per bag. Thus the family made a loss of R$ 1,610.00.

### *Contamination of Organic Production at São Miguel do Iguaçu-PR*

When the Guerini family moved to São Miguel do Iguaçu, the choice of the holding was made in accordance with the farming project they had in mind. After 20 years of soybean cultivation in Paraguay, they intended to carry out organic farming, which has less impact on the environment. With an objective of getting a whole, better balanced holding, they chose an area that had a 1,500 m border with the National Park of Iguaçu, one of the Brazil's most significant nature conservation unit.

Soybean and maize are the main annual crops being produced on their holding, which altogether has 130 ha of arable land. The neighbouring farms have vast monocultures of soybean in summer and maize in the 'safrinha' (small-harvest season).

Sílvio reports that the ecological equilibrium they expected from having farmland adjacent to the park is being destroyed by the toxic agrochemicals used on neighbouring farms. "During the soybean season the smell of the pesticides comes inside the house," he laments. Apart from this smell, the pests are 'driven' to his field; because of the agrochemical sprayings, or the virtually simultaneous harvesting by the neighbours, which leaves the insect pests with no other sources of food.

During the 2006-07 harvest, a new factor finally made the Guerinis' work even more difficult- the contamination of their organic soybean crop by GM soybean. They use their own machinery for harvesting and so this source of contamination can be ruled out. The seeds they used were certified and did not reveal any presence of transgenics when they were tested by the PCR method.

Only the first batch marketed revealed transgenic contamination. The only difference between that batch and the others was the way they were transported to the marketing company, 'Gebana'. The first batch had been hauled using the company's trucks, while the others were transported using the holding's own truck. Since he was aware of the problem of contamination, Sílvio had been around when the truck was being cleaned before the first transport. In spite of this precaution, part of his production could not be sold as organically grown soybean.

In 2006, 'Gebana' identified four cases of contamination, but the number more than doubled in 2007, when nine cases were reported.

### *Contamination of Conventional Soybean at Medianeira-PR*

João Coan Bússulo lives in the rural community of Linha Alegria, at Medianeira, west of Paraná. He grows soybean, maize, wheat, oat, sorghum and sunflower. He also grows fruits and vegetables for his family's consumption, and rears dairy cattle. His farm has a size of 22 hectares.

For the 2006-07 harvest, he purchased soybean seeds at the Cooperative Agroindustrial Lar. João had planned to sell his entire soybean harvest to the company 'Sadia,' which prefers non-GM soybean and pays a premium of 5% of the production value of conventional soybean.

To ensure his production is free from contamination by transgenics, the family uses its own machinery for sowing and harvesting. The bags of the seeds purchased by João had the description, 'produto livre de transgênicos' (Product free from transgenics). João planted 17 hectares of conventional soybean and harvested 980 bags. The trucks he used to haul the produce to the marketing company were cleaned before transportation.

After he handed over his harvest, the tests revealed that 300 bags had more than 4% of GM soybean. João did not receive the 5% premium normally paid by 'Sadia,' for that part of the production. This was a complete surprise to the farmer who attributed the damage to the contamination of the seeds.

The government of the state of Paraná conducted a number of control operations in order to verify the contamination of the non-transgenic soybean seeds on sale in the state. A total of 283 tons of conventional seeds were confiscated since they were contaminated by transgenic seeds. This involved 11 seed-trading companies, with the contamination affecting up to 9% of some lots of seed.

The cases reporte here are an indicator of what is happening in the countryside. They reflect the difficulties being faced by the farmers and clearly show that the entire burden of preventing contamination has fallen on the shoulders of the producers using organic farming and conventional methods.

With the release of transgenic crops, the producer faces another big challenge- one that discourages farmers who want to convert their production to ecological farming systems.

### *Impact of Contamination*

Apart from economic damage caused by market loss, which is quite evident, GMO contamination may lead to the emergence of undesired and unforeseen traits.

Contaminated seeds are impure and originate in crops of reduced genetic purity of the non-transgenic type. The contamination causes damages, but never yields benefits. It can modify the plant's phenotype, and alter or silence the genes responsible for specific and desired characters of the species (e. g. organoleptic properties of the food crop, pest resistance). The silencing of genes can extend over various generations, and its effects could be aggravated by the combinatory and cumulative effect of the contamination, i.e. contamination by more than one type of transgene (e. g. maize varieties 'MON810' and 'Bt11') and through sustained exposure to the source[1] of contamination.

In addition to the problem of losing the organic or ecological farming label, the farmers maybe subject to legal proceedings on account of involuntary infraction of patents.

### *More Transgenics, More Toxic Agrochemicals*

An official survey conducted on the general use of Glyphosate by the Instituto Brasileiro de Meio Ambiente e Recursos Naturais Renováveis (Brazilian Institute of Environment and Renewable Natural Resouces – Ibama), attached to the Ministry of the Environment, has revealed that between 2000 and 2004, a period of strong expansion of transgenic soybean cultivation, the application of Glyphosate in Brazil increased by 95%, whilst that of other herbicides taken together had grown by 29.8%. During the same period, the use of Glyphosate in Rio Grande do Sul, the largest producer of 'Soybean RR', went up by 162%.

When CTNBio approved the commercial production of transgenic soybean, it informed through a Technical Communiqué that:

*"The introduction of cultivars tolerant to Glyphosate will not increase the selection pressure on weed-plants, in terms of Glyphosate concentration (active substance/unit area)."*

Selection pressure is regarded as the principal mechanism that causes spontaneous plants to acquire herbicide resistance. Contrary to what CTNBio had forecast, researchers of EMBRAPA already listed nine plant species capable of not being affected by Glyphosate. Four out of them have already developed resistance to the toxic substance applied on transgenic soybean crops and signify “a great potential of becoming a problem,” according to the authors.

In order to ensure that the weed-plants do not acquire resistance, the producers increase the application rates of Glyphosate, or make use of even more toxic products such as paraquat and 2,4-D (Dichlorphenoxyessigsäure).

As a consequence, following its application to the plants, there is an increase in the amount of toxic residue on the final product, which then enters the food chain. In 2006, the Government of Paraná monitored transgenic soybean crops and found out that 70% of the samples contained Glyphosate residues. Almost 5% of them revealed a residue level above the allowed threshold- 10 mg/kg of soybean grain, with levels ranging from 14.4 to 36.0 mg/kg. It is worth remembering that the residue levels allowed in the country before the release of the Monsanto soybean variety was 0.2 mg/kg.

## *Next Steps*

It is worth noting that the federal organs in charge of public health (Anvisa) and the environment (Ibama) have been alert and have already explored possibilities under the Law to question the release of transgenic crops.

Comments have begun to appear around the idea that the promises of the biotech industry are not being fulfilled. Recently, there were some reports about the decline in the cultivation of transgenic crops in Brazil given that the producers do not find advantages in the use of that technology.

Thinking along these lines, and with an eye on the European market, big Brazilian companies have joined forces to set up an organization of producers and exporters of non-transgenic grains, called ABRANGE – Associação Brasileira dos Produtores de Grãos Não-Transgênicos (Brazilian Association of Producers of Non-Transgenic Grains). It is now a challenge for the Association that their suppliers might be discouraged from opening new areas of virgin land for cultivation, either in the Cerrado, or in Amazonia. The support of the European consumer will be decisive for the success of this, and other similar initiatives. Apart from the pressure caused by the consumer’s preference for non-transgenic products and the position of the companies vis-à-vis the same, we understand the pressure arising out of the defence of the stringent labelling rules, including those for products derived from animals that are fed transgenic mixed-feed rations. The preference for foods produced locally, based on the use of local resources helps reduce the pressure on the natural resources of the exporting countries.

In 1999, organizations of the organized civil society rallied around the ‘Campanha Por Um Brasil Livre de Transgênicos’ (Campaign for a Transgenic-Free Brazil). Since then, the range of partners, support institutions and movements has been growing in Brazil.

Recently, thanks to this mobilization, it was possible to ensure the participation of the Federal Attorney-General's Office in the sessions of CTNBio, to make public; by a judicial order, the meetings of the Commission. A judicial order also obliged the CTNBio to hold public hearings dealing with commercial releases, and decreed that the CTNBio put in place elaborate procedures regulating the commercial release of GMO. The attacks by the big publishing media houses were, and continue to be, ferocious.

## Summary

The potential of agro-ecology has been demonstrated for decades now, all over the world, and its capability to replace the model of the Green Revolution has already been recognised by many organisations, including the FAO. With a view to tackle the crises of food, energy and climate, we need not 'reinvent the wheel,' nor look for 'drought-tolerant' wonder genes, or the like. We need policies that are aimed at investing into what has already proved sustainable, and which prioritize the agro-ecological conversion of the agro-food system with the same intensity with which the global financial system is now being supported.

[1] Heinemann, J.A. 2007, A typology of the effects of (trans) gene flow on the conservation and sustainable use of genetic resources. Rome, UN FAO: 1-94.

# Contamination by Transgenic Crops in Costa Rica – Hidden Pollution in a 'Tropical Paradise'

1.2

*Ute Sprenger*

The debates around Genetically Modified (GM) crops in the South have focused, almost exclusively, on those countries where the area planted with transgenic crops is extensive, and production is destined for the export market. But before these crops can be commercially launched, they have to be field tested and multiplied. Therefore, years before the first authorization and commercial use of GMO seeds in the United States, the country that pioneered genetic engineering, it had already started experimental field testing and multiplication of seeds. Part of this multiplication was, and is performed in states that do not appear on the usual lists of countries growing GM crops. Very often these countries lack a legislative and regulatory framework to handle new challenges like genetic engineering. The lack of a culture of public debate also makes it difficult to address emerging challenges. One such country is Costa Rica, where seed multiplication of transgenic soya, corn and cotton was introduced in the early 1990s by North American, and European seed companies.

International industry and research institutions have used Costa Rica for many years, for GM seed production, and as an experimental testing ground. The agricultural biotechnology industry took advantage of its political dependency, weak state structure, vulnerability to corruption, and a lack of debate in the civil society.

Costa Rica is a small Mesoamerican country, which from outside appears to be an ecological paradise. It has the reputation of being democratic, compared to its neighbours. Also cooperating in the multiplication of transgenic seeds are Chile, Hawaii, Puerto Rico, Mexico and South Africa. In their formal presentations, Costa Rican officials are silent about its connections with the GM crop sector. Instead, we hear that 25 percent of the country is under some kind of environmental protection, or some statements about the country's natural wealth; which is considered to be 'mega-diverse' at the international level. But, in fact, the original vegetation has been destroyed to a large extent to make way for cattle ranches and monocultures of banana, pineapple or ornamental plants grown for export. It is not commonly known, that in this tropical paradise the propagation of transgenic crops started in the early 1990s. In the US, and parts of Europe critical voices began questioning GM technologies in the mid-1980s. Since 1996, European consumers and environmentalists have protested the first arrivals of unidentified transgenic soybeans. In Costa Rica, the GM business did not have the fear of meeting a similar situation.

## The Road to the Transgenic Era

Since 1991, transnational, agro-biotech corporations have used the country to multiply transgenic seeds for the world market. On the advice of international financial institutions, the agricultural sector in Costa Rica had already been transformed in the 1980s to cater to the export of agricultural products. Shortly thereafter, the era of genetic engineering was initiated in Costa Rica, mainly through foreign capital. The following table summarizes the major stages seen in this Central American state:

**Stages of Planting and Reproduction of Genetically Modified Crops in Costa Rica**

| | |
|---|---|
| From 1991 to 1997-98 | Onset of cultivation of transgenic soybean seeds and the supply of basic seeds by Monsanto (US) and Bayer (Germany) in the emerging markets in the U.S. and other countries (Argentina); also small-scale cultivation of transgenic cotton and corn seed. |
| From 1997-98 to 2003 | Cotton seed giant Delta & Pine Land (US) started in Costa Rica with direct investment in a local company for the multiplication and processing of GM seeds. With this, the extensive cultivation of GM cotton seed begins. Area under GM soybean seed declined and GM corn seed was discontinued altogether. Mainly crops and hybrid lines of Monsanto, Delta & Pine Land, Bayer and Syngenta. |
| 2003 to the present | Cultivation of GM cotton seed continues to increase; areas with GM soy are maintained. Cultivation of hybrid lines and varieties of Monsanto, Delta & Pine Land, Bayer, Syngenta and Dow AgroSciences (US).<br><br>At this stage, civil society groups begin their investigation in the GM seed sector. The UNEP-GEF project: 'Development of a National Biosafety Strategy for Costa Rica,' funded by the United Nations and the World Bank, is initiated. This project culminated in 2005 with a proposal for a biosafety law, developed without any meaningful public participation[1] (UNEP-GEF initiated similar projects in other Latin American countries like Brazil and Mexico, as well as in African and Asian countries.) |

Source: Compiled by Ute Sprenger, 2007[2]

Initial production of transgenic seeds took place at a time when Costa Rica was exposed to strong political and economic turmoil. The welfare state was successively dismantled, starting from the late 1970s. Land reform and social reforms of the preceding thirty years were either frozen or withdrawn. There was a shift towards neo-liberal economic policy. Under these political and economic conditions, agri-business development for seed multiplication evolved through tissue culture and micro-propagation of coffee, bananas and ornamental plants on a massive scale, for export to Europe, Japan and North America. As part of this development, the foundation for a seed multiplication industry for GM seeds was established. This business is carried out as follows: The seeds are usually imported from the U.S., multiplied in Costa Rica, and then exported back to the U.S. The seed industry takes advantage of the Central American climate that allows for several harvests during the year. In comparison to the United States or Western Europe, where only a single harvest is possible in a year, Costa Rica's climate helps gather two or three harvest seasons annually. In effect, Costa Rica is a 'greenhouse' for transgenic seeds, for the agricultural bio-tech companies and research institutes of the North.

## Establishment of Transgenic Seed Nurseries

In the sector of transgenic crop breeding, Costa Rica today is specialized in soybean and cotton seeds. There are cotton varieties developed for resistance or tolerance to insects (Bt cotton - *Bacillus thuringiensis*) and resistance to herbicides, as well as varieties of soybean with the brand names Roundup Ready (Monsanto) and Liberty Link (Bayer). The region most affected by these crops is the northern province of Guanacaste. In the domestic market, planting and marketing GM crops is officially not allowed, but Costa Rican law does permit experimental cultivation and breeding for re-export. Although GM interest groups, including national scientific projects and institutions in the U.S., assert that Costa Rica has good capacities for monitoring and control, several independent investigations have proved that the situation is quite different. Like most Latin American countries, Costa Rica currently has no special legislation for the management of modern biotechnology, nor an infrastructure with adequately trained staff to monitor what is happening in the sector.

Monsanto and Bayer were among the first influential companies to establish their breeding activities in Costa Rica. Already in 1991, the first transgenic soybean seeds were multiplied over 400 square meters of land. This was the controversial soybean, resistant to the broad spectrum herbicide Glyphosate, which Monsanto re-imported into the U.S. for experimental planting a little later, and, which shortly thereafter was marketed under the brand name *Roundup Ready*. The area under soybean seed production increased rapidly, as Costa Rica was becoming increasingly interesting to foreign seed companies. In 1999, the area for multiplication and experimental breeding had already reached 175 hectares, and besides GM soybeans, transgenic cotton and corn were also planted. By 2005, the total area for breeding GM crops had increased to more than 1,440 ha (about 90% for the multiplication of cotton seeds). It declined slightly to 1,230 ha in the growing period 2006-07.[3]

For reasons as yet unknown, the multiplication of corn seed came to a halt in 2001. Meanwhile, the experiments by national and foreign research groups with rice, banana and pineapple increased. The so-called 'tourism of GM-liberation' namely the transfer of risky transgenic work to Costa Rica, is still thriving. According to official data, between 1991 and 2005, more than 40 international companies and foreign universities cultivated transgenic plants - experimentally and commercially- for breeding purposes, with the most diverse properties in the country.[4] Thus, these cultures are sown at the command of agro-biotech companies and institutes, and the work is conducted without assessing the ecological or social risks involved. There is inadequate control of the trials by governmental inspectors. The companies and research institutions would never be able to conduct the same business in their home countries.

## Public Opinion and Demands Taking Shape

The transnational companies, together with research groups, benefit from the fact that Costa Rica has inadequate regulatory and control mechanisms for the cultivation of transgenic crops. They have also taken advantage of the permissive political climate that exists in Costa Rica. With regard to the public, this is fortunately changing at last, because from 2003 onwards social groups and citizens began to intervene in the debate. From that year, a new political era came into effect in Costa Rica, in which social and civil rights groups now had some access to information related to the handling of GMOs. This new awareness had to do with the mobilization of civil society around negotiations for the Free Trade Agreement (FTA) between Central America, the Dominican Republic and the United States. In this way, urban and rural groups became increasingly involved in the debate about the country's economic course.

In the northern region, where transgenic cotton and soybean seeds are currently being sown, concerned groups from civil society, faced with a lack of response and information from the officials went into action. A Civic Committee, a citizens' initiative in the district of Cañas, the region where most GM crops are grown, has devoted itself since mid-2004 to the search for sites where transgenic crops are grown, touring the region and interviewing local inhabitants. Until then nothing was known beyond the fact that the seed production industry was active in the district's economy. It did not take them long to discover plantations of transgenic cotton spreading uncontrollably in the area. The residents complained about the massive application of herbicides and insecticides on these plantations.

## The Exposure by Civil Investigations

It became evident from the checks by civil society and on-site investigations that there was a management deficiency on the part of the authorities responsible for monitoring operations with transgenic crops. One clear sign of serious structural weakness in the monitoring process of the authorities is the widespread contamination of the envirnment of the region through dispersed GM seeds. Re-growth of transgenic seed has been recorded in the growing regions in north Costa Rica.

Due to the lack of precaution by seed production companies, the situation has reached a point where GM cotton plants appear at several sites. They have been recorded growing in fields lying fallow, in between subsequent crops, on roadsides and riverbanks as well as in home gardens in the region. The resistant crops of the transnational companies have already become weeds, and the only way to combat them is by using conventional, specific herbicides. In areas where most of the transgenic soybeans, resistant to the herbicide Roundup, are located, the Civic Committee found out that people in the neighbourhood and workers have been consuming GM soy as part of their daily food. This particular soybean is used in other countries for animal feed and not for human consumption- a fact that the inhabitants of this region are unaware of.

Generally, inhabitants of the growing areas, owners of lands or agricultural workers are rarely informed about the characteristics of GM seeds. Questions raised by civil society representatives about cultivation of transgenics, or complaints from residents of the area facing problems i.e. of pesticide pollution, are met with a lethargic response from the authorities. Given the great appreciation for nature and the biodiversity of Costa Rica, this reaction from the authorities is difficult to understand. One cannot rule out an unintentional cross-pollination of transgenics with wild plants. The government should be alert to this danger. In this case however it goes far beyond unintentional contamination and the entire state of affairs is one characterized by gross negligence.[5]

## Critical Voices Demanding Democratic Processes

In Costa Rica, as in other countries of the Global South, the pro-GM technology lobby tries to influence the political decision-making process. It is also engaged in shaping public opinion and the biosafety policies in the respective countries. After all, huge markets are at stake for the biotech seed industry. For example, the U.S. cotton sector is growing rapidly. Possibly speculating on increased exports to China in the future, the USA has dramatically increased the area under production of transgenic cotton seeds in Costa Rica since the growing season of 2003-2004. And since then the influence of industrial lobbying for pro-GM technologies has definitely become significant in this country. This ranges from direct interventions in the decisions of the administration, to the conspicuous presence of U.S. experts, who create a favourable atmosphere for GM technology among local politicians, in the sciences, and the media.

Nevertheless, the worldwide controversy over the risks and precautions needed in the use of GM crops and over the precautions needed has not escaped Costa Rica. In September 2004, the demand for a moratorium on GM crops resounded for the first time from civil society. Increasingly local organizations are seeking information on the implications of the presence of GM crops on fields with conventional and organic crops. The US lobby for gene technology has expressed alarm. Staff members from the USDA (US Department of Agriculture), which works closely with the transnational seed cotton company Delta & Pine Land on cotton seed, refers to citizen questioning in Costa Rica as an 'extreme environmentalist coalition'[6].

In spite of all the efforts of concerned costa rican citizens, public awareness of genetic engineering is still low in Costa Rica. This has changed only a little, despite all the complaints about the seed companies, about their careless handling, growth, harvesting and transport of GM crops. In Costa Rica, an earnest, transparent and informed discussion on the consequences of GM crops is still a long way.

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[1] May Montero, A. (2005). Desarrollo de un Marco Nacional de Bioseguridad para Costa Rica. Informe Final. Proyecto PNUMA-GEF http://www.unep.org/Biosafety/files/CRNBFrepSP.pdf

[2] Sprenger, U. (2007): Fallstudie: Auswirkungen des Einsatzes transgenen Saatguts auf die wirtschaftlichen, gesellschaftlichen und politischen Strukturen in Costa Rica. Gutachten im Auftrag des Deutschen Bundestages, Büro für Technikfolgen-Abschätzung beim Deutschen Bundestag (TAB), p. 42 ff (previously undisclosed)

[3] Portal Central del Centro de Intercambio de Información sobre Seguridad de la Biotecnología http://cr.biosafetyclearinghouse.net/estadisticas.shtml

[4] A small group of national researchers is working with public funds, and in cooperation with foreign institutions.

[5] Sprenger, U. (2008): La contaminación oculta. Semilla transgénica, bioseguridad e intervenciones de la sociedad civil en Costa Rica. Berlín, Alemania/San José, Costa Rica.

[6] USDA/FAS GAIN Report Nr: CS5013 (08/2005) Costa Rica Biotechnology Annual Report 2005 www.fas.usda.gov/gainfiles/200508/146130453.p

# Bt Cotton in Maharashtra

# 1.3

*Joy Daniel*

As is the case with other states of India, agriculture is the main occupation of the majority of the people in the state of Maharashtra, and here, cotton is one of the main crops. The western part of the state has sufficient rainfall and irrigation, while the rest of the area is rain-fed. More than 90% of the cotton is grown under rain-fed conditions. As the soil and the climate suit the cultivation of cotton considerably, Maharashtra has the largest area of cotton under cultivation and also the largest yields. In proportion, the area in Maharashtra where Bt cotton is grown is the greatest in the country. Recent trends also indicate that the area under Bt cotton is increasing.

The large area under Bt cotton can be attributed to many factors. These include the exploitative marketing tactics of the seed dealers and their extension network, together with the ignorance and illiteracy of the farmers. The literacy level in Marathwada and Vidarbha regions of Maharashtra, where cotton is mainly grown, is around 55%, and could be much lower among the farmers. The lower literacy levels, coupled with the gradual loss of traditional knowledge due to the thrust of modern scientific inputs supported by government and private extension networks, make it easier for the promotion of Bt cotton. The farmers are often duped by the promises made by seed dealers. They promise a yield of about 30 quintals per hectare as against 14 quintals per hectare for non Bt cotton under suitable conditions in Maharashtra. They describe experiences of farmers from distant districts that are not verifiable by the farmers. The marketing tactics also include free information and consultations, farm visits, and use of popular personalities for the promotion of Bt cotton. Nana Patekar, a popular film actor, was engaged to participate in several farmers meetings urging them to adopt Bt cotton.

The rise of Bt cotton is more pronounced in Maharashtra with the coming of Mahyco seeds; one of the largest seed companies in India, that works in collaboration with Monsanto. Mahyco, based in the Jalna district of the Marathwada region, is the first to commercially produce Bt cotton seeds and is among the pace-setters in its propagation. The increase in access to seeds adds to the lure of Bt cotton propagation. However, it is hoped that the recent promotion of organic farming by the government and some farmer organizations will thwart the spread of Bt cotton in the future.

Most land holdings in the cotton growing areas of Maharashtra are less than a hectare in size. Studies have also shown that farmers in the rain fed areas of Maharashtra spend much less on agricultural inputs, and their expenditures for pesticides are the lowest in the country. The reasons for this may be manifold – lack of resources to invest in inputs, use of traditional means to manage pests, or many others. For such conditions, it would be more relevant to promote local varieties that are adapted to the region and require low inputs. However, research and promotion of Bt cotton has proved the contrary. Several reports by civil society organizations have linked the high indebtedness of farmers and their suicides during the past decade to their losses through cultivation of Bt cotton.

## Experiences in Bt Cotton Cultivation

The challenges and experiences faced by the farmers of Maharashtra in growing Bt cotton are similar to those in other states. A few of them are as follows:

### *Pest Management:*

Bt cotton is expected to resist the American boll worm, according to the claims of the companies involved. However, it offers no resistance against sucking pests, and recent studies have also indicated that the Bt cotton does not resist the Pink Bollworm (http://biospectrumindia.com/content/features/agri/103111201.asp). It has been reported by the Central Institute for Cotton Research (CICR) that the sucking pests are actually on the increase. This increase has led to greater use of pesticides.

### *Drought Resistance*

As per observations by farmer activists associated with the Institute for Integrated Rural Development (IIRD), in the Paithan district of Marathwada, non-Bt hybrids of cotton have performed better in rain-fed conditions than Bt cotton.

### *Health of Farmers*

Farmers growing Bt cotton in Marathwada frequently complain of certain skin allergies, which never occurred before the advent of Bt cotton. The farmers must be in contact with the cotton leaves and bolls during the harvest period, and during storage. Normally, farmers store cotton in their houses.

### *Mortality of Sheep and Goats*

As in other states, the farmers of Maharashtra have also reported deaths of open-grazing, sheep and goats, after they fed in the cotton fields. In-depth studies are yet to be conducted to make conclusions about the linkage between Bt cotton and the incidence of cattle mortality.

### *Crop Management*

Traditionally farmers involved in cotton cultivation grow cowpeas, pigeonpea or okra alongside their cotton. After they harvest the cotton, the farmers grow green gram, black gram or chilies on the same plot. During the subsequent season, it is normal for the farmers to grow millet. The cultivation of Bt cotton has eroded these traditional practices. Farmers have noted that chili does not yield well on the same soil where Bt cotton was harvested. Contrary to tradition, the Bt cotton farmers follow the recommendations of the seed companies with Bt cotton being the main crop in the plot and the cultivation of five rows of non Bt cotton varieties along the border or 20% of the crop area, whichever is higher.

### *Profitability*

The cost of Bt cotton seeds is 750 INR for 450 grams, as compared to around 300 INR for hybrid seeds. In addition, the cost for pesticides and other inputs is also higher under conditions, which better suit hybrids and local varieties. The overall profitability of Bt cotton cultivation is thereby found to be lower in rain-fed conditions.

### *Distribution of Spurious Seeds*

Riding on the marketing tactics and promotion of Bt cotton seeds, several spurious Bt cotton seeds have also entered the markets. It is not certain if they contain the Bt component but they surely lure the farmers with their claims. These spurious seeds may be just hybrids, or Bt seeds saved by farmers, or may be even seeds for testing. These fake seeds make the situation worse, as it is not possible to track the exact prevalence of Bt varieties and take steps to prevent genetic contamination.

### *Studies by other Development Organizations*

Key civil society organizations like the Indian Institute of Rural Development (IIRD), and farmers, organizations such as Vidarbha Organic Farmers Association (VOFA) and many others agree on the reported experiences of Bt cotton farmers illustrated above. Even the state government of Maharashtra has released reports confirming that non-Bt varieties adapted to the region perform better than the Bt varieties. The table below is from an official presentation of the state government.

| Comparison between different farming systems for cotton | | | | |
|---|---|---|---|---|
| **Component** | **Cost incurred - INR/Hectare** | | | |
| | **Traditional** | **IPM based** | **Organic** | **Bt** |
| Land Preparation | 1700 | 1700 | 1700 | 1700 |
| Seed | 1125 | 1125 | 1125 + 165 (intercrop) | 4000 |
| Inter-culture | 2600 | 2600 | 2000 | 2600 |
| Fertilizers | 2800 | 2800 | 525 (Organic) | 2800 |
| Irrigation | 900 | 900 | 900 | 900 |
| Plant Protection | 6200 | 1200 | 1200 | 4000 |
| Harvesting | 2500 | 2500 | 2500 | 3000 |
| **Total** | **18305** | **13305** | **10595** | **19480** |
| Production (quintals/hectare) | 13 | 14 | 15 | 16 |
| **Total Receipt** | **29900** | **32200** | **34500 + 5700 (intercrop)** | **36400** |

Source: Dr. Sudhir Kumar Goel, Commissioner Agriculture, Pune, Maharashtra. Presentation on 'Bt Cotton – Reality and Challenges,' Nagpur, 2nd – 3rd September 2005.

The above table clearly shows the higher profitability accrued by growing organic cotton as compared to the Bt cotton. The state government therefore has some schemes to promote organic farming and IPM.

## *Rise of Organic Cotton*

Organic cotton projects are rapidly on the increase in Maharashtra. Presently, there are about 75,000 hectares of organic cotton projects in Maharashtra. Cotton being the main crop in Marathwada and Vidarbha regions of Maharashtra, any organic farming project in these regions will obviously increase the production of organic cotton. Organic farming projects in Marathwada are facilitated by civil society organizations like IIRD in Aurangabad district, Ankur Pratishthan in Beed district, Ugam of Hingoli district, and Society for Education in Values and Action (SEVA) of Parbhani district. In addition, farmer organizations like Maharashtra Organic Farmers Federation (MOFF) and Vidarbha Organic Farmers Organization (VOFA) are key players in promotion of organic farming in Marathwada and Vidarbha. Natural Organic Farms, a private entity, manages organic cotton projects of about 15,000 hectares in Maharashtra. If the area under organic farming grows at this rate, the spread of Bt cotton will be restricted.

## Recommendations

As organic cotton has demonstrated its ability to perform well under rain-fed conditions as per the experiences of organic farmers and reports of government and civil society organizations, it will be best to promote organic farming as a means to counter the threat of Bt cotton. This could be done by ensuring better markets for organic cotton and raising awareness on organic farming.

Currently, the market trends indicate an increase in demand for organic cotton and this is expected to remain so. However, any development intervention has to take steps cautiously, to ensure that organic cotton does not replace the area needed for the organic food crops which are more essential to local and national food security.

There is also a lack of knowledge and awareness of organic farming, which inhibits the farmers from adopting organic cultivation practices. There is an inherent belief among many young farmers that organic farming results in decreased productivity and profits. This belief is influenced by the ideas infused during the green revolution. The wide dissemination of information on concrete benefits of organic farming will catalyze thinking among the farmers to practise organic farming and is thereby expected to bring about changes in their farming practices. In parallel, there must be efforts by organic farmers convinced of its benefits, to share their knowledge and provide peer support and encouragement for the cultivation of organic cotton. IIRD and some civil society organizations in Marathwada region of Maharashtra have facilitated a Participatory Guarantee System (PGS) that mobilizes farmers in small groups for peer appraisals to ensure the organic nature of their produce in addition to knowledge-sharing for organic farming. Such forms of knowledge-sharing and peer support can be promoted to enhance the practice of organic farming and to raise awareness among farmers.

# 1.4 The Impact of GM Corn in the Philippines

*Victoria Lopez*

## Introduction

GM crops, specifically Bt Corn, were commercialized in the Philippines in 2002, and Bt Corn made its first entry in the corn growing areas of Mindanao. The Philippine government approved and enforced its commercialization because of the promise of high yields and revenues for the farmer, and the promise of low input costs due to low pesticide usage. It was believed that Corn Borer infestation could be reduced or minimized by the Bt toxin implanted in the Bt Corn crop, thus creating potential savings for the farmer.

However, government agricultural modernization policy that officially promotes GM as well as hybrids and High Yielding Varieties (HYVs) of crops, never did a single study on the potential impact of Bt Corn across the farming population. Nor was there any effort to look at the real food security conditions of the poor farmers who make up the majority of Filipino corn growers, or understand the real and underlying reasons for the low yields that had besieged Filipino farmers for many decades.

A research program undertaken by SIBAT (Sibol ng Agham at Teknolohiya) with EED-JAP (Joint Advocacy Program on Genetic Engineering & Food Sovereignty with the support of the Evangelischer Entwicklungsdienst) tried to look into the concrete impact of GM crops, and the consequent vulnerability of agricultural production and food security of the poorest in Philippine's farming sector – the indigenous farmers or Lumads of Mindanao.

## The Filipino Indigenous People and Conditions of their Food Security

The indigenous peoples of the Philippines constitute homogenous societies possessing distinct cultures and traditions, who have continuously lived as organized communities on communally defined territories. They have possessed and utilized the said territories since time immemorial, and have become socially differentiated from other Filipinos because of historical resistance to the inroads of colonization. The Philippine indigenous peoples are found in various forests, upland and lowland and coastal parts of the country.

The Lumads constitute the largest group of indigenous peoples in Mindanao. The *B'laan Lumads* inhabiting the southern upland parts of the region, particularly the province of Saranggani, were the focus of this research.

A research conducted earlier in the Philippines on indigenous people, by EED partners (sampling 10 major indigenous groups, across the country)[1], came to the following conclusions:

1. **An erratic food consumption pattern, minimal food intake and low nutritional value of the foods consumed, characterize the nature of food availability to the households of indigenous people.** For many indigenous people, food supply in their home areas is unstable, varying widely under different circumstances, and the quality of food available is below the standard dietary requirements.

2. **There are annual occurrences of food shortages, and lean months, when food is insufficient for indigenous communities**. Their agricultural production is insufficient to meet their needs for the whole year, or till the next growing season. It is estimated that 79% to 90% of indigenous households experience food shortages, i.e., 8 out of 10 households.

3. **As a result, seasonal migration occurs as household members leave their regions to seek income-generating activities outside the communities.** Pressure is also mounted on the natural resource base to increase food production. Most of the indigenous people experiencing food insecurity are the ones who have been 'uprooted' from their homes, displaced by government projects, mines, land grabbing, etc.

4. **The EED partners concluded at the end of their research that food supply is unstable across Philippine's indigenous communities.** Food production is largely dependent on tillable land, soil fertility, irrigation and the overall condition of agro-biodiversity. Uncultivated food sources are rapidly declining- if they have not disappeared, mainly due to denuded forests and decreasing aquatic resources. The current faunal and floral resources are not enough to provide for their food needs and what is available is often inadequate to meet their daily dietary requirements.

5. **The factors that led to these conditions**:
   - **Land scarcity and insecure land tenure:** The majority of the people from the IP farming communities still do not have secure tenurial status rights over their land. There are various tenurial arrangements of households: owned,

leased, usufruct, ancestral land, tenant, tax declared. In general, even if customary land ownership by IPs in the Philippines appears to have been reinforced by state-introduced legal instruments, their hold on their land is very weak. Displacement of IPs from their ancestral domains through land-divesting government programs, extractive industries and plantations is rampant. The smallest impact on their vulnerable economic conditions can easily deprive the IPs from their customary land ownership rights and reduce them to tenants. **Land grabbing from IPs- and this situation is more true for the Lumads, is high.**

- **Biodiversity loss:** Depletion of forest cover, the intrusion of HYVs, hybrids and genetically modified crops have significantly reduced species biodiversity of cultivated crops, as well as, floral and faunal resources that form the food base of IPs. Modern mono-crop planting and the concomitant loss of traditional farming practices have done away with the traditional diversity of food crops.
- **Underdeveloped agricultural resources:** Lack of irrigation facilities means people are dependent on rainfall, deficient technical support and basic agricultural services mean they are easily vulnerable to the destructive effects of floods and droughts.
- **Extensive use of high yielding crop varieties** that require huge amounts of inorganic fertilizers and pesticides; the use of HYVs and inorganic farm inputs have made the soil infertile, leaving it unsuitable for traditional rice varieties.
- Since the Green Revolution (GR), hybrid corn seeds had dominated the corn genetic pool, particularly in the lowlands of Mindanao. Seed companies like Pioneer, Monsanto, Cargill have successfully campaigned for, and steered the shift to hybrid seeds, and this has given an impetus to chemical-based hybrid farming since the early 1980s. This was facilitated by government agencies; particularly the local Department of Agriculture, during periods of calamities for instance, under the garb of using these techniques to fight hunger in the affected localities. The shift to hybrid seeds by the companies Pioneer, Monsanto and Cargill was basically a campaign to compel the people to shift from food to feed with the introduction of yellow hybrid varieties, to meet the demand for feed from the commercial livestock production in the country.

As a result, **the entry of HYVs had altered the traditional, synchronized rice cropping calendar. This had affected mutual aid systems and other traditional practices, and disrupted the exchange of traditional knowledge.**

## Findings of the JAP Research

These conditions were verified by the primary investigation conducted through randomly selected samples, selected from among the B'laan farmers of Saranggani in Mindanao, who were among the first in the region to use Bt Corn in their farms.

The findings on two B'laan communities in this paper are based on the primary investigation of thirty-three (33) farmers who use Open Pollinated Variety (OPV)/ traditional, hybrid and Bt Corn. Farmers from communities in Saranggani Province of Mindanao were randomly selected from two barangays (Spring and Lun Padidu), representing each of the three types of corn farming systems (hybrid, GMO and traditional agriculture). The selection was made from mid-slope and upland ecosystems, where a combination of farming systems are practiced. The sample cuts across the following occupancy types- farmer owner/cultivators and tenants.

The research aims to gain a better understanding of the impact of farming systems and technologies associated with the three seed types (OPV/traditional, hybrid and Bt Corn), on the food security of the said communities. As indicated earlier, these communities are representative of the mid-slope and upland sections of Lumad agriculture in Mindanao.

The findings of the research are given below:

1. **Since about 2000, the intrusion of modern agricultural practices has seen the co-existence of traditional corn farming with modern corn (hybrid and Bt Corn)**. Hybrid and Bt Corn varieties are cultivated in the plains, while OPV/traditional varieties are cultivated on slopes and in hilly areas.

   In the lowland areas corn is planted thrice a year. Here, the yield from the first crop is normally higher, due to better climatic conditions and availability of water. The communities follow the cropping calendar so that most of them plant in a synchronized pattern, with a time difference of, at most, 2 weeks. In the mid-slope parts, corn is planted twice a year, along with root crops and vegetables. The farmers alternate the major staple, corn, with upland rice.

2. **Hybrid and Bt farming practices means incurring crop loans.** Crop loans (seeds and fertilizer) are required, if poor farmers need to continue with hybrid and Bt Corn cultivation. The cost of production is mainly expended on labor, seeds and fertilizers.

   For a hectare of land, in the two barangays, the cost of hybrid seed varieties ranges between Philippine Peso (PhP)1,800 to PhP 2,400, while the cost of Bt Corn seed ranges between PhP 4,800 to PhP 5,400. In Nop and Padidu, hybrid seeds bought from corporation outlets (Monsanto, Cargill, Pioneer, Syngenta) cost PhP 1,800, and seeds bought from local traders cost PhP 2,000. Cultivating hybrid and Bt Corn seeds thus demands ready availability of cash.

   *The lure of crop loans solely attracted the B'laan or Visayan farmers to get into hybrid or Bt production.* Animals and land are often held as collateral in lieu of a crop loan. The harvest payment is delivered to traders who decide the price or produce to be paid against the loan amount, plus the interest. The interests range from 10% to 100%, depending on the lending entity.

The use of traditional seeds helps OPV farmers keep the production costs low. Thus, if farmers were to get rid of hybrid or Bt seed, they could still revert to traditional farming because open pollinated varieties are still available.

3. **Traditional farming on mid-slopes persists, but a comparatively much weakened production system exists alongside hybrid and GM corn farming.** Traditional farming still continues to be the basic source of food of the B'laans, along with other practices. They still do collective cultivation of newly opened land, the women still conserve seed and they all collectively harvest (upland rice/corn) and share the produce within the community. Seeds of the traditional open-pollinated maize variety, mainly tiniguib, are selected and conserved each harvest season for use during planting next season, as well as for consumption when the main harvest is consumed.

4. However, while the villagers still find mutual labor exchange practices beneficial, it is being replaced by individualism which is reinforced by the conditions set for hybrid and Bt production loans.

5. **The pool of traditional corn varieties or OPVs is found to be generally weakened-constituting only about 30% of the total number of varieties being used by farmers in the villages.** This is due to the increasing use of hybrid and Bt Corn seeds by farmers, as well as the loss of farmland for traditional cultivation in the slopes and hilly areas. The white *tiniguib* is the widely preferred, widely spread variety, and is maintained as the food crop from the traditional gene pool of corn varieties, hence all other traditional varieties, except for four (4), are already lost in the gene pool.

   Despite the shift, upland farmers are still able to maintain some native corn varieties that remain unsullied by either chemical inputs or hybrid seed incursion.

6. **The net yield performance of hybrid and Bt are comparative, and Bt Corn, in earliest planting, has proven to give relatively higher yields than OPV.** However, the outcome of this research also confirms **that there are drawbacks and limitations with Bt, as with hybrids:**
   - Formerly subsistent farmers (now planting hybrid and Bt Corn) no longer get food from yellow corn production; hence, food security becomes further precarious during lean months. Some families have been forced to eat hybrid yellow corn grits in dire times
   - Floods and droughts -the most common production problems, remain the main hurdles to high productivity, even with Bt Corn;

- From the yield results, it has been observed that the main reason for lower than average yield and even crop failures (net loss) during the first cropping is flooding due to heavy rains, while drought and drying up of crops under unusually hot weather lower yields during the second crop. The use of second generation hybrid and Bt seeds also results in lower yields; the farmers try to reuse seeds to save on costs. The attacks by the Corn borer is another factor resulting in lower than average yields among OPV farmers. *The survey found 10 instances of lower than average yields and 2 instances of crop failures out of the 33 respondents (i.e. planting events).*
- **The crop loans trap the hybrid and Bt farmers in a debt trap, threaten their economic security, and lead to loss of land and farm resources.** Production costs are much higher for hybrid and Bt users resulting in a higher deduction from the gross incomes. Production costs with interest lead to a heavy deduction from their gross income, and inability to pay means losing one's land and animals.
- **A tenant status, or lease-holdership further cuts away the income of farmers.** The share of the landowner (20% to 25%) needs to be deducted from the gross incomes of all tenants or shareholders. But leaseholders or tenant farmers lose their right to choose crops and seed types, and decide or design and develop their farming system to meet their development objectives. Further, due to lack of adequate income that can help meet basic household needs, most B'laan farmers who originally owned the land they till, were forced to sell their land through the Voluntary Offer to Sell (VOS) scheme. This transformed the leaseholders, or those with tenant status paying a rent to the landowner for use of the land. In the communities studied, leaseholdership has become the principal mode of land tenure, which according to respondents, developed in the last 10 years.

7. **Food insecurity is perpetual among the B'laans of Saranggani, even with the introduction of hybrids and Bt Corn.**

   The periodic lean months are determined and exacerbated by the poor harvest of the preceding crops; hence these are experienced mostly at the start of the first crop, because the second crop yields are usually low. Farmers cope by subsisting on bananas and root-crops. To meet the cash shortage, they take up the back-breaking work of charcoal production, or borrow money from small lenders, at 10% to 20% interest.

8. **For OPV farmers, the mid-slope conditions intrinsically pose bio-physical limitations to getting good yield. The lack of production support (e.g., irrigation) relegates the farmers to a corn production cycle besieged by flooding and drought. The lower yield performance of OPV result generally from poor (erosion-prone) soil and water conditions that is normal on sloping terrains. Water sources are**

**usually distant from upland farms; hence the *farms are totally rain fed during both croppings.***

On top of this, is the coming together of the other reasons that compound the problems of an already underdeveloped corn farm. It is because of these measures that the yield performances of OPVs are comparatively low (measured in gross yield).

9. However, the outcomes of this research reveal certain advantages of traditional agriculture:
   - The harvest ensures availability of food for consumption (corn grits are a staple on every table)
   - The income from OPV is comparable with hybrid and Bt Corn, both in upland and lowland types, when the amount taken for consumption is included. [However, for OPV food consumption (20 to 40 sacks of corn per household, average 30 sacks, or about PhP 9, 000 to PhP 11, 000.00)[2] is already partly assured over and above the net income. OPV production is partly for food, i.e., for household consumption, and partly for the market. Both hybrid and Bt Corn are produced mainly for animal feed and all are therefore sold to traders and converted to cash.]
   - Traditional methods require no expensive inputs, hence OPV farmers do not suffer the debt pressures experienced by hybrid & Bt farmers
   - **It sustains the diverse food production system that preserves farm biodiversity and ensures the subsistence and survival of upland farmers during lean periods;** and **sustains the tradition of cooperative labor.**

## Loss of Agrobiodiversity

10. The **genetic base of the two communities is generally weakened by the increased use of hybrid and Bt Corn seeds by farmers.** While seeds were traditionally controlled by farmers, access and control to the mainstream gene pool (hybrid and Bt) is now controlled by the market forces in Lumad agriculture; i.e. today, hybrid and Bt seed resources are accessible to the farmers only through local traders in the community. To obtain hybrid and Bt Corn seeds, the farmers have to take a loan which they pay either through cash or crop in the next harvest.

11. **This research also confirms that traditional farming continues to support genetic diversity in food crops, which is rich in the island of Mindanao.** This research had also shown that the uplands today still nurture the traditional varieties, which remain under the care of women Lumad farmers, who continuously do their selection, care and saving of seeds.

**The potential genetic contamination of traditional corn varieties is a strategic concern for diversity, food security- especially among indigenous communities dependent on corn, and on the integrity of sustainable traditional farming systems.** The proliferation of Bt Corn threatens to narrow the indigenous corn genetic pool (Bt and non-Bt contaminated), and in the process, contaminate improved and traditional varieties of corn. Increasingly there will be less delineation between corn for animal feed, and corn for human consumption.

## Conclusion

Through this research, it has been shown that GM/Bt technology is not suitable for bringing about any improvement in the lives of the Lumad indigenous people. Like the green revolution, it is a technological innovation that extracts profit from farmers and entraps them in debt and poverty. Further, it takes the farmers away from sustainable, traditional farming practices that provide them food, and from agro-biodiversity that keeps the cooperative tradition alive, which ensures their survival in the context of marginal upland conditions.

[1] "Our Harvest in Peril, a Sourcebook on Indigenous Peoples' Food Security", EED Philippine Partners' Task Force on Indigenous Peoples' Rights, 2004.
[2] PhP 10.00 per kilo of shelled corn, 70 kg. per sack; shelling recovery at 50%.

# 1.5 GMOs and Food Aid in Southern Africa

*Andrew Mushita*

## Introduction

The region of Southern Africa has enormous potential to produce adequate food to feed its inhabitants, and yet requires substantial amount of food aid. Despite positive growth rates, the South African Development Community (SADC) regional agricultural production and the food security situation remain unstable, and are on the decline. About 76 million people or over 40% of the region's population live in extreme poverty[1]. In real terms, food production is falling, fuelled by a number of factors such as- recurrent droughts, climate change, desertification, lack of supportive agricultural policies, poor planning and infrastructure, political instability, lack of credit and input supply.

The other elements that have aggravated this situation include the continued and drastic global increase in prices of staple cereal crops, the dismal failure of global markets and the introduction of agro-fuels. As a result, food prices keep spiraling, and so food is often beyond the reach of the large majority, who are poor. Social indicators such as, landlessness, unemployment, illiteracy, the absence of appropriate skills, high levels of malnutrition, declining life expectancy and unsatisfactory access to basic services also continue to deteriorate.

The surge in food prices has reduced the purchasing power of poor people and inhibited the ability of the poor countries to import food for their hard pressed populations, especially in Southern Africa[2]. The forecast for the next several years is that a range of developing countries will struggle to access affordable food supplies, with uncertain consequences[3].

The largest increase in the number of undernourished people has been in Asia and in Sub-Saharan Africa, which in 2003-05, together accounted for 750 million, or 89% of the people in the world wracked by hunger. The number of poor people in Africa has also doubled to 300 million- more than 40% of the continent's population[4].

The regional food situation is further complicated by the fact that Southern Africa has the highest prevalence of HIV/AIDS in the world. There has been an alarming increase in the number of households headed by children, the chronically ill or grandparents. Moreover, because HIV/AIDS has devastated agricultural productivity, food shortages and chronic poverty are likely to persist for many years to come.

## Food Sovereignty

Food sovereignty provides people with the right to access nutritious and culturally compatible food. In contrast to food security, which simply assures that people have food to eat, food sovereignty seeks to alleviate hunger through the creation of sustainable, localized, food-producing networks.

A revised strategy for food aid can compliment the goal of food sovereignty, giving recipient communities increased control over food choices, while at the same time increasing the efficiency of food aid delivery. The SADC region has made progress in providing food security. But this progress has come at the expense of food sovereignty. Reliance on the import of 'in-kind,' food aid, in times of crisis, has led to market distortions, hurting local food producers.

The Zambian case of 2002 is a clear indication of politicization of food aid, as US government officials and institutions tried to use international and domestic pressure to force Zambia to accept GM food. The tactics included holding the Zambian government responsible for starving its own people to death by not accepting the GM food donations.

The move towards sourcing food aid from local food production centres would offer nations a greater choice in determining food compatible to their needs, and which can alleviate hunger and stress caused by the political and environmental crisis.

## The Human Right to Food

The Right to Food is defined as a human right, established by law in the Universal Declaration of Human Rights (URDC). The United Nations and member states recognize the Right to Food as imperative to the health and well being of individuals. The FAO set guidelines in conjunction with Article 25 of the Universal Declaration of Human Rights stating that - "the right of everyone to have access to safe and nutritious food is consistent with the right to adequate food and the fundamental right of everyone to be free from hunger."

The Right to Food proposed in the Universal Declaration of Human Rights, is mirrored in the many of the national constitutions within SADC. These SADC constitutions have clauses outlining the government's role in ensuring protection for basic rights to life. Countries such as Angola, Malawi, and South Africa, all have constitutional clauses, defining food as an essential right to life.

## Agro-Fuel and Food Security

The advent of agro-fuels and demands for large quantities of feedstock (seeds, fibers, roots) that have to be produced quickly had a soaring effect on food prices. The goal of highest yields will further entrench the dominant commercial agricultural model - chemical monoculture on large expanses of land. In the name of efficiency, the current producers of agro-fuels use monoculture plantations for maize, soy, and sugar, and maximize fertilizer and water inputs for big, uniform harvests.

For crops, such as jatropha, most often planted on the fringes of marginal land, the planting patterns would have to drastically change to large scale monoculture in order to grow sufficient feedstock. Growing jatropha on marginal lands might help community use of jatropha oils for soap and replace paraffin, but such cropping pattern could never sufficiently supply global markets.

Agro-fuel markets, demanding high yielding crops and huge harvests, also gives impetus to industries that seek to profit from genetically modified organisms. These new plans can be to genetically modify cassava to produce higher sugar content, or to genetically modify the cellulose composition of other plants, so that they can be more easily broken down to extract the liquids. Free trade agreements, including EPAs, can then become instruments for advancing agro-fuel production within South countries. On the other hand, there are no trade regimes currently regulating agro-fuels.

## Food Aid and Biodiversity Loss

The FAO and various other studies[5] highlighted that the major factor contributing to biodiversity loss was industrial agriculture. In contrast, farmers with small holdings practice diversified farming systems, which include intercropping. These practices enhance the varied characteristics of different crop species. Crop diversification farming practices act as a hedge against calamities such as droughts, pests and diseases. They preserve old varieties of crops thereby enhancing food security and livelihoods. Many farmers with small holdings consider biodiversity as the basis of agriculture, food security, poverty alleviation, improvement of livelihoods and food sovereignty.

The global agribusiness is moving fast with the global agenda to promote modern agriculture, dominated by mono-cropping farming systems. The seed materials used are mostly high-input, high-output varieties, which require significant amounts of chemical fertilizers and pesticides. The introduction of GMO materials is further compounding matters, as it contaminates most of the available biodiversity in the farmer's fields.

## Food aid as Sluice for GM Introduction to Africa - Results of a Study

Food aid donations containing genetically modified foodstuffs and culturally incompatible varieties of food contradict the definition of "adequate food," put forth by the United Nations Food and Agricultural Organization (FAO). The FAO states that "for food to be considered adequate, it must be culturally acceptable and it must be produced in a manner that is environmentally and socially sustainable." The import of genetically modified food has eroded the ability of sovereign nations to make choices around their food supplies.

The food reserves, and especially those of maize, and stocks of seed in southern Africa are already heavily contaminated by GMOs. These are the findings of a preliminary research project done by a consortium of four academic/NGO organizations. They took 666 samples from crops and food in 5 SADC countries. 68 of them (10 %) proved to be GMO-positive. The results vary in the range of 2% to 30 %, according to different countries. Testing was done in Malawi, Namibia, Zambia, Zimbabwe and Swaziland.[6]

The samples were taken from farmer's harvests, from traders, breeders and also from organizations providing food-aid. The charity organizations specially were unwilling to cooperate and provide information to the researchers. The laboratory of the Research Bureau of Tobacco in Zimbabwe (TRB) made the analytical GMO identification, because the relevant technical equipment and experience was available there.

The highest rate of contamination was found in samples from the private sector. Second in ranking was the food from the food-aid stocks. The high level of GMO pollution surprised researchers, because none of the countries had authorized the commercial use of any GM crop or the legal import of GM food. The regulations require that imported maize or sorghum coming in as food aid has to be milled at the port of entry. What was the source of contamination?

The researchers concluded that in most cases the contamination must have its origin in the food aid shipments. The rule that the kernels must be milled at the border has apparently not been followed. Most of the food aid is bought by the donor agencies in international markets, or are gifts from the cereal surpluses of the USA. The US government provides grain in kind to private charity organizations for food-aid purposes. The US government resists any plan to identify the donated grain as 'GM-free' or 'may-contain GMOs,' simply because 73 % of the US maize and 91 % of the soy is from GM seed sources. The research project identified a number of farmers who admitted that they used the kernels from maize food aid that had not been milled, as seed on their fields.

## Bio-safety

The Bio-safety Convention (Cartagena Protocol) recognizes the sovereignty of governments, giving them the power to refuse any commodity deemed harmful. By making use of their right to apply the precautionary principle, governments have the ability to assess the benefits and potential hazards of new biotechnologies. For example, it allows countries to ban imports of genetically modified organisms, if there is insufficient scientific evidence that the product is safe under the specific circumstances prevailing in their country. Most countries have signed the Cartagena Protocol. According to this international agreement, all GMOs in that country need to have proper authorization for release and commercialization, which will only be granted if that specific trait has passed the risk assessment of that country. All fourteen members of SADC have signed the Biosafety Protocol, although few of them have put in place the necessary legislative frameworks to regulate the movement and safe handling of genetically modified foods stuffs. They have used the policy space given by the Cartagena Protocol to set a requirement that imported maize, sent as food aid, has to be delivered as flour.

The above mentioned study sent a questionnaire to 229 policy decision-makers and experts in the field of biosafety and food handling. The results reveal that most of the so-called experts do not know much about the issue of GMOs. Many resisted responding. Only a tiny group of academics were sufficiently informed about biosafety requirements and safety conditions. The inspection system, regulation and control are in deficit at all levels. The border controls on GMOs are almost absent.

Food aid may not be the only sluice for GMOs entering the countries illegally, but a very important one indeed. In Malawi for instance they found a high rate of GM contamination with local sorghum. Nowhere in the world is GM sorghum admitted for commercial use. There are experimental trials with GM sorghum in the USA. The only sorghum that entered the country came from food aid. Thus if the researchers found GMO-sorghum on the fields of the smallholders in Malawi, in all likelihood, the trait must have escaped from the trials in the USA on a rather large scale, contaminating the sorghum fields in the surroundings. Part of the harvest from those fields must have incidentally found their way into food aid deliveries bound for Malawi.

This contamination has to be taken seriously, since sorghum is one of the main, staple food for the poor of Malawi, and it is one of the best drought prone cereals- a safety net in times of deficient rainfall. If the local varieties lose their drought tolerant characteristics because of cross-pollination with US GM sorghum, the people will suffer even more from climate change.

## Global Warming – Deterrent to Development

The need for solutions to hunger is becoming increasingly pertinent and may be complicated by the effects of global warming. In particular, Southern Africa displays great susceptibility to 'green house' global warming, which will adversely affect agricultural production, exacerbating current problems due to drought, flooding, and desertification. Losses in overall biodiversity, rapid deterioration of vegetation in land cover, and depletion of available water due to the destruction of aquifers and catchments, are also possible with climatic changes.

Giving special attention to fresh water availability, the IPCC finds that water resources will become increasingly vulnerable. As of now, over 19 countries in Africa face water scarcity and that scarcity is expected to double by 2025. This dire prediction, coupled with the fact that "most policy makers now recognize drought as a recurrent feature of Africa's climate," leads to a troubling outlook for Southern Africa.

Reduction in agricultural production would not only jeopardize international trade, but regional food security would also be affected thereby increasing the need for food aid. Increases in the frequency, and severity of droughts in the Southern African region could impede food sovereignty. The strengthening and expansion of current food networks within the region could greatly aid in mitigating the negative effects associated with global warming. In this regard, there is need to develop food aid policies and regulatory frameworks for the region, which will ensure that import, donation and distribution of safe food are a part of a long-term strategy.

## Agricultural Model

The agricultural model prevailing in the SADC region is driven by the logic of free trade agreements such as the World Trade Organization (WTO) and the European Union Economic Partnership Agreement (EPAs). Free trade is linked to the model of agriculture that promotes monoculture and market-based farming systems. The agricultural model is based on the massive introduction of chemical fertilizers, which might be profitable for a few modern farmers and to the corporations selling agricultural inputs, but not to the mass of African peasants. It contributes to global warming, pollutes run-off and ground water, and degrades the organic composition of the soil.

## Food Aid

The prime mandate of the World Food Program is to reduce the number of people who face nutritional deficiencies, in the world. The World Food Program (WFP) pursues this goal through the distribution of food aid in a manner that is efficient, culturally sensitive, and respectful of the autonomy of the recipient countries. The second mandate of the WFP is to promote the production of trade and agricultural infrastructure with the goal of creating conditions of long-term food production. Strengthening long-term food production will ensure that the nutritional needs of the people within the recipient country are met. The WFP works to achieve both of these goals simultaneously.

In 2003, WFP assisted 10.3 million people within the SADC region through emergency food aid. The cost of the food was pegged at USD 311 million. The food aid provisions covered Zimbabwe, Mozambique, Swaziland, Malawi, Zambia and Lesotho. The shortages were most acute in Zimbabwe and Mozambique, as food availability has decreased over the years.

The primary consideration here is how food aid should be regulated without compromising, but by supporting the sustainable, domestic food production base of the recipient country. Secondly, food aid should be injected with 'agricultural development and recovery supportive mechanisms' that enhance local food productivity.

This is critical, as there are many challenges associated with food aid:

- External control of food aid is mostly driven by the donors
- It promotes the market interests of food-aid donating countries
- The politicization of food aid
- Corporate control of food aid
- Commodity market distortion via food aid
- Suppressing the ability of the food-deficit countries to produce their own food
- Absence of supportive, agricultural development mechanisms
- Contamination of agro-biodiversity due to the planting of food aid materials by farmers
- Perpetuation of food insecurity and the decreased hopes of achieving food security and sovereignty by food aid recipient countries

In this regard, the food provided should be culturally acceptable, preferably sourced from within the region to promote regional socio-economic development and integration, whilst benefiting different sectors of the economy. The table below highlights the distribution of food aid by various categories in 2005.

**Table:1 Food Aid Distribution by Category in 2005**

| Category of Food Aid | Million Tons Provided |
|---|---|
| Emergency Food Aid | 5.2 |
| Project Food Aid | 2.1 |
| Programme Food Aid | 0.9 |
| Total | 8.2 |

Source: WFP 2005

Sub-Saharan Africa received 4.6 million tons, or slightly over 56% of the total food aid distributed by WFP in 2005. The delivery represents a 22% increase from 2004, which is a significant proportional increase.

In 2007, the World Food Program procured 50% of its food aid from global markets. During the same period, the organization acquired 2.1 million metric tones of food valued at USD 767 million[7]. Of this amount, USD 253 million was spent purchasing 902,000 metric tons of surplus food in Africa, which is a major policy shift.

Though this policy shift is commendable, the concept of food aid for development is still questionable, as most affected countries have never used this assistance as part of any development policy. For many food deficit countries in the SADC region, food aid has lead to increased dependency on food imports. This dependency combined with economic decline has meant, scarce resources to finance food imports, which has resulted in increased poverty and hunger.

As noted by Mousseau[8], there is a negative correlation between food aid flows and international cereal prices, which shows that the main driver of food aid remains the 'domestic support to farmers and agribusiness interests of developed countries rather than the needs of developing countries.' In most cases, most of the developing countries, especially in the region were forced to undertake structural adjustment programmes in the agricultural sector. The argument was that they should turn their agricultural sector into cash crops for export to earn foreign exchange to import food and help pay off debts. This policy change did not achieve the desired results but rather negatively exposed most of these countries, as they are experiencing continuous food deficits and are now relying on food aid.

Finally, most of these countries abandoned the policy of maintaining strategic food reserves, which used to provide the requisite social safety nets and self reliance on national food needs.

The region needs to address the issue of highly subsidized food aid that would be dumped on the local market thereby affecting the competitive ability of local farmers in producing food. In this regard, domestic producers will be unable to compete fairly as governments of recipient countries are not encouraged to put in place any market protection measures for the local farming sector. However, the current increase of food costs at the global level will significantly affect food deficit countries, as food will be used as a political weapon to control unfriendly countries.

There have been policy shifts from 'in-kind' food aid to purchasing locally by the Europeans. This is also a shift away from long-term development to short-term humanitarian relief, which does not have the agricultural recovery and development agenda.

## Conclusion

It is clear that most of the SADC countries will not achieve national food sovereignty through food aid, as it does not incorporate the development agenda. There is need for the regional countries to develop policies and legislative frameworks that will regulate inflows of food aid and will not undermine local food production capabilities. Such policies need to promote: diversity farming, minimize biodiversity contamination, limit the import of GMOs, support food sovereignty, encourage regional integrated trade as food aid sources, re-establish strategic food reserves and develop appropriate alternative energy sources.

Much of the GMO materials found in the SADC region enter the countries by food aid sources. It is documented that there are significant levels of GMO contamination. The crops mostly affected are maize, cotton, soy beans and those coming as livestock feed. Though some countries have biosafety regulatory policies and legislative frameworks in place, the enforcement capacity is still very weak. The other challenge relates to monitoring cross border trade, between, and among the regional countries. Making food aid the source of unintentional GMO introduction needs to be stopped.

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[1] Mpande 2008
[2] CSIS Task Force Report on the Global Food Crisis, 2007
[3] WFP, 2008
[4] Thompson 2008
[5] FAO, State of the World Report, Rome 1996
[6] N. Bhunhu/D. Garwe/M.T. Makamre/A.T. Mushita, Study on the Distribution of Genetically Modified Organisms in five Southern African Countries, Harare 2007, unpublished paper
[7] World Food Programme, 2008
[8] Mousseau

# Transgenic Contamination of Mexican Maize: Civil Struggles in Defense of Maize and Food Sovereignty[1]

1.6

*Catherine Marielle*

## Maize: The Heart of Life in Mexico

Maize is the key to the material and spiritual sustenance of farmers and rural families of Mexico. Its roots can be traced back to the Mesoamerican civilizations. Maize is the basic food for Mexicans; it is grown on six, out of every ten hectares cultivated in Mexico. It accounts for more than 60% of the country's agricultural production, in terms of volume. There are approximately three million maize producers in Mexico, and nearly 18 million people depend directly on maize production.[2] Maize growers are mostly small and medium-sized farmers, with 75% holding less than five hectares.[3]

Mexico is the center of the origin, domestication and genetic diversity of maize. The domestication of maize began approximately 9000 years ago, and today farmers continue this process by selecting seed from the previous year's harvest and planting their *milpa*, which is the traditional, polycultural system in which maize, beans, squash, chilies and tomatoes are grown together, with numerous wild plants also grown alongside, including aromatic, medicinal and ornamental plants. More than 300 generations of maize growers have not only managed to domesticate maize, but also to continually improve maize harvests in accordance with the requirements of the soil and climate in a great diversity of ecosystems, as well as the innumerable culinary preparations of maize. As a result, there is enormous genetic diversity of maize (*Zea mays)* in Mexico: 59 landraces have been identified in addition to a great number of sub-races, and at least 1200 local cultivars.[4] *Teosinte,* the wild relatives of maize are still found growing in national territory. They belong to the genus *Zea* (*Z. parviglumis, Z. perennis, Z. diploperennis*, *Z. mexicana*, *Z. luxurians*, etc.), and the various species of *Tripsacum*, the genus closest to *Zea* (*T. jalapense, T. zopilotense*, *T. dactyloides*, etc.). With their genetic diversity, these ancestors of maize continue to contribute to the variability of maize through the gene flow resulting from the open pollination of this crop.

At least a tenth of the planet's biological wealth can be found in Mexican territory, and Mexico is a center of domestication for 15.2% of the edible plants in the world's agricultural system. Maize is a product of this biodiversity, and has also contributed to it. It is a *plant brother* that shares the blood, soul and heart of the 62 ethnic groups that still populate the Mexican national territory. It is a foundational myth of Mexican cultures.

## Maize in Mexico's Current Agricultural Policies

The new agricultural order in the world was introduced to Mexico with its adherence to the General Agreement on Trade and Tariffs (GATT) in 1986. Gradually, public policies oriented toward food self-sufficiency were abandoned, and policies focused on replacing domestic production with imports were adopted, together with policies that eliminated subsidies, deregulated product prices, liberated costs of inputs, reduced public research, opened up trade, and profoundly modified Article 27 of the Constitution, opening the way to the loss of social (*ejidal* and communal) property, which is the fundamental patrimonial system of the rural and indigenous peoples.

The profound inequalities acknowledged between the Mexican, Canadian and U.S. agricultural systems did not stop Mexico from signing of a trade agreement that lacks adequate precautionary schemes, that covers all agricultural sectors and opens up borders to products key to Mexico, including maize. The North American Free Trade Agreement (NAFTA), which entered into effect in 1994, has not led to the announced goal of regulating grain imports. On the contrary, Mexico has increased its purchases from the U.S.A., and this has severely affected national producers, who lack the conditions and government assistance received by US large farmers.

Mexico's total food dependence increased from 15% in 1982, to 20% in 1994, and to 40% in 2005. It reached 50% in 2008,[5] which cost over 20 thousand millions dollars, more than the Mexican rural budget for the year, with a deficit over 3 thousand millions dollars in food balance.[6] In staple food grains alone, Mexico's dependence is currently 50% in wheat, 70% in rice and 95% in soy beans. In the case of maize, the country has moved from being nearly self-sufficient in 1993, to 25% dependence in 2007. Mexico imports between 8 and 10 million metric tons of maize each year, the cost of which increased by 69% in 2008, because of financial speculation on food and increased production of ethanol from maize in the U.S.A.[7]. The benefits have gone to major corporations like Cargill, ADM, Maseca and Minsa. In the first 14 years of NAFTA, the price of maize *tortilla*, the essential and basic Mexican food, increased 738%, resulting in a new 'tortilla war' in 2007.

While the national situation for maize is clearly adverse, production has risen in recent years. In 2006, 22.1 million metric tons of maize was produced on 8.5 million hectares, while consumption rose to 26.9 million metric tons. In 2008 there will be a record production of 24.5 million metric tons.[8] For this reason, we maintain that national demand could be satisfied with domestic production if the government would implement agricultural policies which fairly assess the role of agriculture and maize in the country's economic life. But the government has preferred to promote imports from the U.S.A., even though this means an increase in poverty. The number of Mexicans living in poverty is estimated at 50 million by the World Bank, of which 19 million suffer food poverty.[9] The loss of 2 million rural jobs between 1994 and 2006 and an increase in the emigration of the rural population, at 400,000 persons annually, makes the picture complex. Migration of youth increases, accelerating the loss of traditional knowledge. In many villages, women carry the burden of agricultural work and household chores alone and often bear the responsibility for children and old family members as well.

In short, current policies exclude small farmers, especially subsistence farmers, and favor large agricultural producers. Even government authorities acknowledge that only 15% of the country's agricultural producers have benefited from trade liberalization. Current policies also encourage the privatization of Mexico's biodiversity. In one of the most recent modalities, transnational corporations are negotiating directly with producer organizations and rural and indigenous communities. In 2007, Monsanto reached an agreement with Mexico's National Rural Confederation (*Confederación Nacional Campesina*—CNC) that both parties would contribute resources toward the recuperation, conservation and commercial development of maize landraces and varieties originating or developed in Mexico. The agreement was signed in exchange for the corporate rural confederation's acceptance of planting transgenic maize in Mexico, and it opens the way for the transnational corporation to take ownership of the distinctive genes in the rich diversity of native maize.

Trade liberalization policies have, in the end, led to the transgenic contamination of Mexican maize. The United States has been growing Genetically Modified (GM) commercial varieties of maize since 1996. By 2006 it was growing approximately 27 million hectares annually.[10] Since the USA does not separate conventional maize from GM maize, and it is our primary source of imported maize, tens of millions of metric tons of transgenic maize has entered Mexico over the last 12 years.

## Contamination of Maize in its Center of Origin

Since the introduction of transgenic maize in Mexico through imports became public knowledge, we have warned of the risk that it could contaminate Mexican native maize fields. As scientists and civil organizations, we have warned that GM corn could be planted as seed, and that transgenes could be introduced into native maize varieties through cross pollination. Nevertheless, Mexico did not stop maize imports from the USA, nor did it demand that the USA separate transgenic maize from conventional maize, as have Europe and Japan.

In 1997 scientists from Mexico's official National Committee of Agricultural Biosafety (*Comité Nacional de Bioseguridad Agrícola*—CNBA) proposed a moratorium on transgenic maize within the national territory. This proposal was based on serious considerations, such as the possibility that imported transgenic maize could provoke a loss of maize genetic resources, endanger the country's biodiversity and cause additional environmental damages. A year later, the Bureau of Plant Health (*Dirección General de Sanidad Vegetal*) stopped accepting requests for planting GM maize, essentially implementing a *de facto* moratorium. This was a first step toward applying the precautionary principle, but it proved inadequate.

On September 18, 2001, the Ministry of the Environment and Natural Resources (*Secretaría de Medio Ambiente y Recursos Naturales*—Semarnat) reported the transgenic contamination of maize in the states of Puebla and Oaxaca, based on the findings of researchers Ignacio Chapela and David Quist, of the University of Berkeley. Their findings were published shortly thereafter in the journal *Nature*. In October that year, 40 civil organizations and 15 citizens presented Mexico's Inter-Ministry Commission on Biosafety of Genetically Modified Organisms (*Comisión Intersecretarial de Bioseguridad de Organismos Genéticamente Modificados*—Cibiogem) with an 'Emergency plan for detaining and reversing the genetic contamination of Mexican maize.' Our proposal was to determine the sources and magnitude of the contamination, to inform all those potentially affected, establish detection mechanisms, remediate the cases of modified maize without trampling on local farmers, take legal actions against those responsible, and complete the legal framework for biosafety. Cibiogem did not respond to the plan. Two months later, we, five civil and farmer organizations together with a researcher, presented the Federal Attorney's Office for Environmental Protection (*Procuraduría Federal de Protección del Ambiente*—Profepa) with a popular denouncement, which is a specific legal process in Mexico. Profepa asked the responsible authorities to conduct an investigation, and transgenes were found in eleven locations in Puebla and Oaxaca.[11] However, Profepa never issued a corresponding recommendation despite its obligation in this regard.

Given the passive response of national authorities, in April 2002, the communities of Oaxacan adversely affected by the contamination, went to the North American Commission for Environmental Cooperation (CEC) and asked for an in-depth study. Eighty-six Mexican and international environmental and rural organizations participated in this request. The final CEC report, presented in October 2004, indicated that Mexican authorities should have informed the farmers of the contamination of local maize varieties with transgenic sequences in 2001. The actions recommended in the report include: to maintain the moratorium on commercial planting of transgenic maize; to minimize the import of maize (as grain) from countries where commercial GM maize varieties are grown; to establish a monitoring system; to label maize from Canada and the United States regarding the presence or absence of transgenic grain; to determine the specific traits of transgenes found in native maize and *teosinte* varieties; to evaluate the risks for the environment and health derived from the introgression of transgenes; and to support on-site conservation and planting of native maize cultivars. The CEC report was rejected by the Mexican authorities.

## Public Policies in Biosafety: Contradictions, Gaps and Human Rights Violations

In 2003, Mexican and U.S. agricultural authorities signed the "Requirements for Documentation of Live Modified Organisms (LMO) for Food, Feed or Processing," through which up to 5% of transgenic grain are allowed, till date, in shipments of imported maize, even when labeled "non-LMO shipments." It is noteworthy that the European Union tolerates an accidental presence of only 0.9%, and that too only if this presence is unintentional and technically unavoidable.

Also in 2003, Cibiogem decided to lift the *de facto* moratorium—four years after it went into effect—on planting transgenic maize on an experimental scale. CNBA, the predecessor of Cibiogem, based its work on the precautionary principle that Genetically Modified Organisms (GMOs) could negatively impact agro-ecosystems and therefore anyone interested in planting GM crops must demonstrate that this is not the case. However, Cibiogem focuses on implementing biosafety with a new policy to promote biotechnology.

As the center of origin and genetic diversity of maize, Mexico was obliged to legislate with absolute precaution, in line with the Cartagena Protocol on the Safety of Biotechnology. However, on March 18, 2005, the Law on Biosafety of Genetically Modified Organisms (LBOGM) was passed. It is more favorable to trade in transgenic organisms than to caring for Mexico's genetic patrimony, the foundation for the lives of millions of Mexican farmers and consumers. For this reason, the law has been coined the 'Monsanto Law.'

This law does not reflect the recommendations made by CEC, nor does it incorporate the precautionary principle established in the Rio Declaration, the Convention on Biological Diversity and the Cartagena Protocol—three international legal instruments that Mexico has signed.

Mexican legislators have not obliged those producing and commercializing products derived from GMOs to label them as such. They have also failed to include a requirement to identify fields where transgenic crops are planted. No effective procedures for assigning responsibilities and demanding compensation were established in the case that conventional or organic crops are contaminated with transgenes. If consumption of food derived from GM crops causes health problems to consumers, no liability is involved.

The only provision for biosafety in the law prescribes special protection for maize by marking areas in which transgenics are restricted, as GMO-free zones — such as centers of origin and genetic diversity. This only came about as a result of the many interventions made by civil society organizations and independent scientists in the National Congress.

Nevertheless, in November 2006, authorities released guidelines as an initial step on how to determine centers of origin and diversity. They are very much in line with the demands of those who like to plant transgenic maize in the northern region of Mexico. Between 2005 and 2006, there were three attempts to authorize requests to plant transgenic maize—apparently for experimental purposes—but each time, we were able to stop them by publicly denouncing their violation of the Law on Biosafety. In March 2008, the regulations for this Law were published, which resembled a manual for companies interested in planting transgenic crops. In March 2009, through an illegal reform of the regulations, the government eliminated the special protection of maize, now left to authorities' arbitrary measures. In April, Monsanto requested permissions for planting transgenic maize.

## Multiple Strategies Used by Civil Society in Defense of Maize

In 1998, GEA together with some other organizations of civil society systematically analyzed and disseminated information from scientific research conducted in other countries. We developed brochures, books, videos, radio programs, web pages.[12] Every year we have increased our participation in workshops and seminars, and we have given talks in rural areas and in cities, in public, academic, student and other contexts. We have promoted debates, covering historic, cultural, environmental, economic, political and ethnic aspects of biotechnology and biosafety, biodiversity, traditional knowledge, food sovereignty and sustainability, biopiracy and patents, world trade. By bringing these issues to the fore in the media, especially newspapers, magazines and radio, we have reached an increasingly broader range of the public, and we have exerted pressure on decision-makers, through frequent articles, reports and collective press conferences.

Workshops and discussion fora have been held every year, organized by the 'Network in Defense of Maize,' which brings together indigenous, rural and civil organizations and communities. Now we can speak of a national, pluralist and diverse movement in defense of our traditional biodiversity of maize.

The states of Chihuahua, Morelos, Mexico, San Luis Potosí, Tlaxcala and Veracruz are also affected by transgenic contamination, according to studies conducted in 2003 by the Network. More recently, transgenes were detected in the rural areas of Mexico City[13] and again, on a larger scale, in the state of Chihuahua.[14]

The struggle in defense of maize and against transgenic maize is part of the struggle for reviving food sovereignty and redefining the role of agriculture in Mexican society. In 2003, the national rural movement known as 'El Campo no Aguanta Más' (The countryside can't bear anymore) requested the federal government to open a National Dialogue for the Rural Sector. The main demands were, to restrict the import of products that are strategic for national security and food sovereignty, to renegotiate the agricultural section of the NAFTA agreement and to guarantee safe, non-hazardous imported food. The National Agreement for the Rural Sector that was eventually signed by the government and a number of rural organizations did not include the movement's primary demands. This led to the split in the movement.

A huge exhibition dedicated to Maize People, entitled *Sin Maíz no hay País* (Without maize, there is no country), was displayed at the National Museum of Popular Cultures (*Museo Nacional de Culturas Populares*) during most of 2003, and was visited by more than a half million people. This exhibition was organized jointly by a governmental institution, the Bureau of Popular and Indigenous Cultures (*Dirección General de Culturas Populares e Indígenas*), together with two civil society organizations, *Centro de Encuentros y Diálogos Interculturales* and GEA.[15]

In 2007, we launched the national campaign *Sin maíz no hay país*, focused on NAFTA renegotiation and against GM maize. In a broad movement among hundreds of rural, indigenous, environmental, human rights and consumers organizations, scientists, intellectuals and artists, we undertake collective actions in rural areas and cities.

Since the Regulations for the Law on Biosafety were officially published in 2008, we, a number of civil, rural and indigenous organizations, have worked together to challenge the cultivation of GM crops through a legal procedure known as *amparo* in Mexico, emphasizing their illegal and unconstitutional nature. The municipality of Tepoztlán in the state of Morelos supported these efforts by initiating a constitutional dispute. These legal struggles, which demand that the federal judicial branch review the actions of government authorities in the areas of agriculture and environment, open the way for future legal actions in the fight against transgenic maize.

## Working towards a Sustainable Country Free From Transgenics

There are many initiatives opposing GMOs throughout the country, which in addition favor reviving native varieties, promoting agro-ecology and fair trade. Conceptually, these initiatives are part of the proposal for sustainable agricultural systems. It is a fight against the economic policies that have confined Mexico's agricultural sector to the logic of the world market. The need to re-establish the traditional, basic links between agriculture and food, between Mexico's rural areas and cities, by reconstructing alliances among the sectors that produce, process, distribute, commercialize and consume food products, is essential in this process.

In order to refocus on indigenous, traditional forms of agriculture that can be traced back thousands of years, and to counteract the prejudices from decades of imposition of the industrial model of agriculture, we, a number of rural, civil and academic organizations, are working together, to carry out agro-ecological projects based on the sustainable use of natural resources and on comprehensive, self-managed community development in hundreds of communities. Links between rural and indigenous organizations and communities have been expanded, with the integration of the gender perspective in many activities. In various Mexican states there are also initiatives aimed at creating a direct link between producers and consumers, and local and regional companies guaranteeing people supply of good-quality tortillas, prepared with our own GM-free maize.

All of us are confronting the danger of transgenic contamination of our maize. Some of us are turning towards establishing GMO-free territories. In 2004, broad sectors of the Oaxacan population followed this strategy and managed to get the local Congress to reach an agreement on this issue. Similar declarations were also made in Tlaxcala and the Federal District (Mexico City).

In the context of the International GMO Opposition Day, the first Transgenic-Free Food Fair was held on April 8, 2006, in the Mexican cities of Texcoco, Puebla, Tlaxcala, Jalapa, Guadalajara, Oaxaca, Uruapan and Mexico City. As the organizing committee for the fair in Mexico City, we presented a 'GMO-free' label, to emphasize that the Law on Biosafety sidestepped the need to label transgenic products.

## Conclusion: Challenges in Defense of Mexico's Maize and Food Sovereignty

The main challenge for rural and indigenous communities is to survive, not only economically, but also as people maintaining their way of life and culture. Indigenous people and the rural populations are the guardians of biodiversity and nature, which they refer to as their Mother Earth.

Civil society organizations committed to the causes of Mexico's rural sectors and rural people, have argued that there is no reason to depend on agro-chemicals or transgenic crops. It is possible to advance toward ecological agriculture without sacrificing yields. The academic and scientific sectors have progressively gained importance in public debates. Increasingly, there are more researchers who speak out on critical issues like biosafety and GMOs, and substantiate their views.

Although there are more than a hundred million consumers in Mexico, there are very few independent groups defending consumer rights. It is vital that we meet together in our neighborhoods, towns and rural communities to discuss the importance of eating good food and reflect on our consumption habits. Awareness about the consequences of consuming junk foods should be raised. This is crucial, as diabetes is a major killer in Mexico. Food sovereignty is a matter of survival for the whole society. Native maize is past, present and future for Mexican people and for humanity.

Maize is our flesh, our bones, our being, our life.
It is that which stands up, that which moves, that which becomes joyful and laughs, that which lives: maize.
(Aztec poem)

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[1] Summary and updated version of case study: "La contaminación transgénica del maíz en México. Luchas civiles en defensa del maíz y de soberanía alimentaria," C. Marielle (coordinator) and Lizy Peralta, GEA, 2007.

[2] The National Council Population of Mexico estimates rural population at 29.8 million, accounting for 27.9% of the national 106.7 million inhabitants in July 2008.

[3] Fanghanel, Héctor, 2005, "La liberación del maíz y el frijol en el 2008 en el marco del TLCAN," *Rumbo Rural*, No. 2.

[4] Boege, Eckart, "Los inventarios de la agrobiodiversidad de los pueblos indios," presentation at *Foro Por la Defensa del Maíz y la Soberanía Alimentaria ¡No más dependencia alimentaria! México, Programa de Intercambio, Diálogo y Asesoría en Agricultura Sostenible y Soberanía Alimentaria-México y Voces de la Soberanía Alimentaria*, Legislative Building, September 13, 2007, Mexico.

[5] *Centro de Estudios para el Desarrollo Rural Sustentable y la Soberanía Alimentaria* (CEDRSSA), *Reporte Rural de Coyuntura, 2008*, Mexico.

[6] Facultad de Economía, Universidad Nacional Autónoma de México (UNAM). Report: "*Situación del campo en México; pobreza, marginación, explotación y exclusión*", 2008, Mexico

[7] In 2006 the United States used 41 million metric tons of maize to produce ethanol and it is calculated that it will require 25 million more each year to satisfy its domestic ethanol demand.

[8] According to data from the *Sistema de Información Agroalimentaria y Pesquera* (SIAP) of the *Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación* (SAGARPA).

[9] With the current crisis it is estimated that 70 million Mexicans are now living in conditions of poverty.

[10] See the 2006 annual report of The International Service for the Acquisition of Agri-biotech Applications.

[11] Ezcurra, E., S. Ortiz and J. Soberón-Mainero, 2002, "Evidence of gene flow from transgenic maize to local varieties in Mexico," in Craig R. Roseland (editor), *LMOs and the environment,* OECD, Paris. In 2005, a new research by Sol Ortiz et.al. demonstrated the lack of transgenes in samples taken in 2004, in a publication largely used by Monsanto to minimize the risks of contamination and promote GM seeds. Nevertheless, a new research led by Elena Álvarez-Buylla reports finding transgenes in locations sampled in 2001 and again in 2004, confirming in 2008 the persistence of transgenes in landrace genomes. This report will be published in the Journal of Molecular Ecology.

[12] Examples especially worth mentioning include the radio collection *Los transgénicos ¡hoy, hoy, hoy!* broadcast on hundreds of community radios and disseminated by rural and indigenous organizations in Mexico and Central America, and the video *¡Vamos al grano! ¡Cuidado con el maíz transgénico!*, which is being distributed throughout the entire country, together with other materials produced by GEA, some of them along with Greenpeace and other organizations, in order to contribute to these efforts at awareness-raising.

[13] Serratos-Hernández, José Antonio *et al*., 2007, "Transgenic proteins in maize in the Soil Conservation area of Federal District, Mexico," *Frontiers in Ecology and the Environment*, 5(5):247-252.

[14] In September 2008 Mexico's Ministry of Agriculture (SAGARPA) acknowledged the contamination in Chihuahua, nearly a year after it was denounced by Greenpeace. A probable source comes from selling 25 thousand bags of hybrid maize in which MON810, MON863 and NK603 transgenic varieties were detected.

[15] The book entitled *Sin maíz no hay país*, coordinated by Gustavo Esteva and Catherine Marielle, and published by *Consejo Nacional para la Cultura y las Artes* and *Museo Nacional de Culturas Populares* in 2003, accompanied the exhibition and served as a guide and information base.

# 1.7 Who Needs Golden Rice?

*Charito P. Medina (PAN-AP)*

## What is Golden Rice?

Golden Rice is a genetically engineered rice with the capability to produce beta (β) carotene, the precursor of Vitamin A. It is called Golden Rice (GoldR) because of its characteristic orange/yellowish color, the color of carotenoids. This new technology was first developed by Dr. Ingo Potrykus of the Swiss Federal Institute of Technology, in Zurich, and Dr. Peter Beyer from the University of Freiburg, Germany, between 1991 and 2000, with an expenditure of about $100 million[1]. It was initially funded by the Rockefeller Foundation, the Swiss Federal Institute of Technology, the European Community Biotech Program and the Swiss Federal Office for Education and Science[2].

The production of β-carotene in rice endosperm was made possible by inserting three foreign genes into rice, one from a bacterium (*Erwinia uredovora*) and two genes from the daffodil (*Narcissus pseudonarcissus*). The initial level of β-carotene in Golden Rice 1 (GoldR1) was very minimal at 1.6μg/g. This was criticized, still the industry propagated Golden Rice as a solution to blindness caused by Vitamin A deficiency. Continuous research improved the level of β-carotene in what is called Golden Rice 2 (GoldR2) to 31μg/g, using corn as the source of genes[3]. GoldR2 is based on the original design, but uses fewer or different genes.

Despite the hype surrounding the development and potential use of GoldR, the level of Vitamin A in it is still very low compared to the content of Vitamin A in many naturally occurring, and cheap foods in the tropics. Independent scientists, farmers, consumers, and development workers, see the real purpose behind Golden Rice as a public relations tool, a 'poster child' as it were, of the biotech industry to win acceptance for genetically engineered foods and products.

Syngenta bought the patent and licensing rights over GoldR1, but solely developed GoldR2. On 16$^{th}$ October 2004, it used the attention around World Food Day to announce the donation of GoldR2 to the Golden Rice Humanitarian Board, under the same conditions and licensing terms as the previous Golden Rice.

A Golden Rice Network, based at the International Rice Research Institute (IRRI), is now active in further development of GoldR, particularly in breeding the 'golden' trait into local rice varieties. The network is composed of the IRRI, Philippine Rice Research Institute (Philippines); Cuu Long Delta Rice Research Institute (Vietnam), Department of Biotechnology, Directorate of Rice Research, Indian Agricultural Research Institute, University of Delhi South Campus, Tamil Nadu Agricultural University, Patnagar University of Agricultural Sciences, Bangalore Chinsurah Rice Research Station (India); Bangladesh Rice Research Institute (Bangladesh); Huazhong Agricultural University, Chinese Academy of Science, Yunnan Academy of Agricultural Sciences (China); Agency for Agricultural Research (Indonesia); University of Freiburg (Germany), including Syngenta and other private and public institutions (Barry, 2007). Syngenta has 'donated' its Golden Rice lines for use by the Golden Rice Network, as well as to poor farmers in developing countries.

## Current Status of Golden Rice

Currently, the development of Golden Rice and its advocacy is extremely vigorous. The governments of India and Switzerland have signed an agreement for the technology transfer of genetically engineered Vitamin A rice[4]. Local transformation and breeding of Golden Rice is performed by local institutions like the Central Rice Research Institute, Punjab Agricultural University, Tamil Nadu Agricultural University, and University of Delhi. The varieties where Vitamin A is being engineered are IR64, ASD16, PR114, and Pusa Basmati[5]. Golden Rice has also been aggressively promoted in Bangladesh.

The Philippine Rice Research Institute (PhilRice) and IRRI are crossing Golden Rice with PSB Rc82, a widely grown rice variety in the Philippines[6]. The National Agricultural Research Systems in China and in Vietnam are also active in the development of Golden Rice.

To produce rice with high pro-vitamin A is undoubtedly a scientific breakthrough, but to claim that it can address multiple nutritional deficiencies and prevent blindness is unscientific. It is an obvious public relations stunt pulled by corporate scientists to garner acceptance of genetic engineering.

In fact, Golden Rice perpetuates the industrial model of agriculture, which eliminates biodiversity, and is the major cause of decline in dietary diversification- the main cause of malnutrition.

## The Problem with Golden Rice

Golden Rice cannot address the biological, cultural, and dietary factors that are the underlying causes of Vitamin A deficiency. VAD is just one among a multiple set of malnutrition symptoms. For example, how can β-carotene be absorbed in individuals having very low fat intake, or those having recurrent diarrhoea, intestinal parasites, or other illnesses?

Even if the β-carotene is absorbed, there is the question of toxicity due to an overdose. Vitamin A in low dosages is necessary for health, but at high dosages, it can cause liver damage leading to death[7]. Vitamin A toxicity can cause abdominal pain, nausea, vomiting, and bulging fontanelle. Chronic toxicity can cause bone and joint pain, hyperotosis, hair loss, dryness and fissures of lips, nausea, hypertension, low grade fever, and weight loss[8].

One critique against GoldR was the claim that a person needed to consume as much as 9 kgs of this rice, in order to meet the daily recommended dosage of Vitamin A[9]. With GoldR2, IRRI tried to address this issue by increasing the carotenoid level. But the question still remains- Can these increased levels be translated into the same amount of Vitamin A (conversion rate)? There is no research on it yet.

Furthermore, is the Golden Rice safe from any novel genotypic characteristics that could put human health at risk? In genetic engineering, pleiotropic (unintended and unwanted) effects are common because the gene transformation process is random in that there could be more than one site of insertion of the foreign genes. The foreign genes are also likely to rearrange, or they may be subjected to deletions or repetitions. All of these unintended effects could possibly produce new kinds of protein products that have not been seen in the evolutionary history of human consumption, with the attendant risks of reduced nutrient levels, or enhanced levels of anti-nutrients, toxins or allergens[10].

How about any potential ecological change in the receiving environment? Even if rice is self pollinated, breeders contend that there is still a 10 percent possibility of out-crossing with other rice varieties. Contamination of varieties can also happen through seed mixing or in the field from volunteer plants (plants that grow on their own from seeds carried in the wind, left in the field from the last harvest, etc.) that are mixed during harvest. The contamination of long grain rice by genetically engineered herbicide-resistant rice (LL601) from the U.S.A., last year, is illustrative with regards to contamination effects. The danger is that field contamination is irrevocable and cannot be contained.

Since the Golden Rice is yellowish, consumer resistance is also anticipated because of the color, and perhaps the texture of the rice. Who will shoulder the losses to farmers if nobody wants to buy yellow rice, either due to the color or due to the rejection of the GE food by consumers?

Another technical obstacle is that β-carotene fades with storage[11]. If Golden Rice is to be delivered to Vitamin A deficient locations, the issue of timely delivery will have to be addressed and the consumers will have to be informed about the loss of Vitamin A in storage. Families will have to consume the rice within a specific time. This will be impractical for remote communities, which often keep their grains for a year's consumption due to limited transportation facilities. Families will thus have to change their consumption patterns in order to get the best out of Golden Rice. What will be the advantage of Golden Rice to traders who usually keep grains in warehouses for a season if it will lose its β-carotene in storage? They would be better off supplying Vitamin A rich vegetables to the consumers.

## Who is Pushing Golden Rice?

Is the technology of Golden Rice really free? The technology in the development of Golden Rice involves 70 patent claims on the genes, DNA sequences and gene constructs (Ho, 2001). And soon after the revelation of technical possibility of Golden Rice, AstraZeneca (now Syngenta) made an agreement with the technology developers (Drs. Potrykus and Beyer) for commercial exploitation of the technology via patents and licensing agreements. It was then announced that the corporate owners of the patents would not collect royalty or technology fees on Golden Rice from 'resource-poor farmers in developing countries,' who earned less than US$ 10,000 from their farming income.[12] It was announced that only farmers from the developed countries would be required to pay royalty fees. But the announcements did not say whether farmers would be allowed to save seeds for replanting. Neither did the owners abandon the patent, which means that they can change the arrangement on royalty fees at any time.

Golden Rice, being heralded as a cure to VAD, is a naïve, technocratic solution to a complex nutritional problem associated with poverty. Golden Rice is an attempt by the North to solve the problems of the South, which the former does not seem to understand. It is a typical example of the 'silver bullet' solution to complex problems, and is bound to fail.

However, there appears to be a more insidious motive behind the interest in Golden Rice; corporate interests undoubtedly being the crux. Golden Rice research was initiated at a time when genetically modified organisms were being rejected by consumers, farmers, and civil society. Thus, Golden Rice is just a Trojan horse to create acceptability of genetically modified crops and food. Through Golden Rice, the image of the biotech corporations has been recast as philanthropic and humanitarian. Consequently, Golden Rice could pave the way for other genetically engineered crops and ultimately change the food we eat, and secure widespread corporate control of agriculture and food systems.

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# Part 2

## The Effects - Socio-economic Issues Around GMOs

# Socio-Economic Impact of GMOs on African Consumers

2.1

*Cathy Rutivi, Julius Mugwagwa*

## Introduction

The debate surrounding genetically modified organisms (GMOs) remains an important one for consumers and consumer organisations the world over, and is characterized by strong views for, and against the technology. The debate is of particular interest to Africa, where the countries are yet to embrace the new technology and where food security challenges tend to amplify the dilemma faced by decision-makers. Consumers, represented through the work of consumer organizations, are a very active and vocal constituency in this debate, as it unfolds in Africa.

Genetic engineering involves techniques of combining genes from widely different types of organisms, which do not occur naturally. Hence, predicting the impact on the environment and human health, in the future, is difficult. The uncertainties and controversies around GMOs, or products, centre on many issues including trade, food and environmental safety. With regard to the environment, there are fears of gene flow from GM-crops to non-cultivated plants, agronomic risks from resistance problems in GM crops and in weeds, co-existence challenges between fields of farmers using GM-crops and those not using them; among others.

On the basis of these concerns, an internationally binding Cartagena Protocol on Biosafety (CPB), governing international trade in GMOs, was adopted on 29th January 2000, under the UN Convention on Biological Diversity. The main objective of the Protocol is "to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health, and specifically focusing on trans-boundary movements."

The objective of this paper is to inform the reader on how the consumer movement has contributed to the GMO debate in Africa in the past few years and to highlight the potential socio-economic impacts on African consumers. Firstly, the paper summarises the consumer movement and its work with the Joint Advocacy Project on GMOs; and secondly looks at the potential social, ethical and cultural impacts. Economic and environmental impacts are also discussed. The Socio-Economic Impact Assessment tool is highlighted as one of several tools to guide bio-safety decision-making policy. A few recommendations and policy implications are given at the end of the paper.

## CI's GM Campaign and Contributions to the Debate

Consumers International (CI), the global movement that represents national consumer organizations, has played an active role in making consumers across the globe aware of the need for appropriate, consumer-friendly policies and bio-safety regulations.

In its effort to undertake significant campaign-oriented activities through the creation of a GMO campaign within its Food and Nutrition Programme, CI's past work in Africa, through most of its members, included work on creating awareness among citizens of different countries and lobbying governments to take precautions in applying and adopting the technology and its products.

Between 2004 and 2005, the Africa office convened several workshops and conferences for stakeholders to debate the issue, raise awareness and educate consumers on the technology. A study published in 2005, on the status of biotechnology and bio-safety in six selected countries of the world, including South Africa, indicated that at that time the majority of countries had no effective legal frameworks to regulate the technology. South Africa was then the only African country that had commercialized GM-crop production. However, since then Egypt and Burkina Faso[1] have joined the so-called 'biotech countries,' while the number of countries with legally-binding regulatory frameworks has increased only marginally[2].

Consumer organisations in Africa were being requested to advise their governments on whether they should accept GM food in the face of mounting hunger in their countries. In Zambia, the Zambia Consumers Association (ZACA) advised the government to take a precautionary approach. Other CI members in the region, including the Consumer Council of Zimbabwe (CCZ), Pro-Consumers, in Mozambique, and the Consumers Association of Malawi (CAMA), all took the position that donated GM corn or maize should be milled to eliminate the risk that it might be planted.

In 2005, CI launched its 'Consumers Say No to GMOs' campaign in response to the increase in GM food and crops and highlighted the gaps in policies and a lack of protection for consumer rights. CI was calling for mandatory labelling of GMOs, independent testing for safety and protection of GM-free crops from contamination.

The success of the three-year Joint Advocacy Project 'GMOs a threat to Food Sovereignty' promoted cross pollination and fusion of ideas, where partners from

Africa, Asia and Latin America, coordinated by Evangelischer Entwicklungsdienst (EED), worked to promote the rights of farmers to save their seed and to farm the way they choose; the rights of consumers to know and to make informed choices; and where vital and detailed researched information was exchanged and shared. As part of the Joint Advocacy Project, CI's main contribution was to organise a workshop on GM Labelling in Africa- 'Protecting the African Consumer's Right to Choose,' which was held from 9$^{th}$ to10$^{th}$ August 2006, in Johannesburg, South Africa, in collaboration with ACB, another Joint Advocacy Project partner.

The event brought about 30 participants together, including 13 EED sponsored participants, made up of CI members and staff, Joint Advocacy Project members and members of the South African organisation, SAFeAGE. Other participants included South African government officials, business representatives, and other stakeholders. The outcome was capacity building for consumer activists and a campaign event at a local supermarket. Training sessions provided participants with new information to reinforce their efforts with respect to lobbying for labelling, stricter bio-safety legislation, bans and GM-free areas and provided outreach and education to consumers, activists and farmers. Feedback from participants indicated that the objectives had been achieved, and that participants appreciated the division between the more theoretical learning in the workshops, and the practical experience of the campaign event.

Currently, CI is implementing a project in eight countries between January 2008 to January 2010, aimed at increasing the prioritisation of bio-safety in the developing world for the benefit of biodiversity and consumer health and safety. This is based on the principle that consumers have the right to access a healthy, sustainable environment, to choose what is right as judged by them, and to be informed. They should be able to skilfully advocate their own interests in this area, and ensure implementation of the CPB, particularly with respect to public awareness and participation, the Biosafety Clearing House and risk assessment and risk management, as well as development and implementation of effective national legislative frameworks.

In Africa, three countries namely, Kenya, Mali and Morocco are participating in this project. One of the activities aimed at building the capacities of consumer organisations in the participating countries, for campaigning and advocacy broadly in the area of biosafety/GMOs, targeting different stakeholders in the regulatory decision making process, was done through a training workshop on these areas in Nairobi, in September 2008. There were participants from ten African countries- Kenya, Mali, Morocco, Nigeria, Malawi, Zambia, Zimbabwe, Uganda, Ghana and South Africa. It is envisaged that efforts such as these will go a long way in strengthening bio-safety policies and regulations in the participating countries and in ensuring that consumer's rights are upheld.

## Impact on Consumers

Socio-economic, cultural and ethical considerations have not received as much attention as the risks to the environment, human health and biodiversity. Article 26 of the Protocol on Socio Economic considerations says that:

*'The parties, in reaching a decision on imports under this Protocol or under its domestic measures implementing the Protocol, may take into account, consistent with their international obligations, socio-economic considerations arising from the impact of Living Modified Organisms (LMOs) on the conservation and sustainable use of biological diversity to indigenous and local communities. The parties are encouraged to cooperate on research and information exchange on any socio-economic impacts of LMOs, especially on indigenous and local communities'.*

Consumer policy seeks to ensure that basic consumer rights are recognized and promotes understanding of people's rights and responsibilities as consumers. The eight universal consumer rights which form the basis of consumer campaigns are: the right to safety; the right to be informed; the right to choose; the right to be heard; right to redress; right to consumer education; right to a healthy environment and the right to satisfaction of basic needs; along with the five consumer responsibilities of action, social concern, critical awareness, solidarity and care of the environment.

## Social, Ethical and Cultural Impact

African consumers also want to preserve their traditional foods and cultural practices and patterns, for example on-farm seed-saving by farmers (explained further, below). The general African consumer believes that local food forms part of an identity, a natural form of expression that cannot be found anywhere else, therefore consumer preferences reflect this strength of cultural identities. Thus any form of new technology that appears to threaten this status is of concern to African consumers with regard to undermining local cultures and value systems connected to food consumption and production.

The consumer movement in Africa tends to strengthen the position of groups of consumers who are often marginalized. Women play a critical role both as producers and consumers of goods and services. In Africa, women are the main decision-makers with respect to household consumption issues and are generally responsible for buying food for their families and managing household disposable incomes. A number of consumer organizations in Africa have organized women's buying clubs.

In recognition of the importance of youth in the consumer movement, CI has also introduced a consumer responsibility day (15th October) with the aim of promoting consumer education curriculum in schools. Guidelines on consumer education for youth have been prepared and disseminated to national governments.

The right of farmers to save seeds is another contentious issue with GM crops. These could impact on the traditional practice of saving, reusing, sharing, exchanging and selling farm-saved seeds. This traditional practice is widely regarded as a foundation of genetic diversity in agriculture today. Therefore stringent application by multinational companies of intellectual property protection systems on seeds potentially threatens food security and the way communities have always functioned. (TWN Briefing 3 for MOP4, 2008) GM crops have increased the biotech industry's control over seed supply, which is worrying as it creates monopolies and a culture of dependence for small-scale producers. In countries where there is an undue reliance on imported seeds, food production is undermined when foreign currency is in short supply, as is the case in Zimbabwe.

In South Africa where GMOs are grown commercially and sold in some supermarkets, consumers have successfully lobbied for the Consumer Protection Bill to make labelling a requirement of the legislation, to inform the public which foods are GM-free and which contain GM products. From 2006, the South African Freeze Alliance on Genetic Engineering (SAFeAGE), a network of organised consumers, initiated a nation-wide campaign for mandatory food labelling and support for a GM-free food list in South Africa. SAFeAGE has been successful in mobilizing consumers, educating and creating awareness on the debate nationally. Their well-researched and detailed submissions to the National Consumer Tribunal resulted in the success of the Consumer Protection Bill retaining its important, original sectional text on labelling of GMOs, which had been removed.

## Economic Impact

To the ordinary consumer, GM crops have not brought the much-touted benefits. They are not necessarily cheaper, or of better quality. Industry still drives the choices on the traits being imparted to the crops, with herbicide tolerance and insect resistance being the most prominent. Thus, currently, the commercialized GM crops are largely benefiting the agribusiness and seed industries that control GM traits and the chemical products associated with GM crops. Therefore, the increase in GM crops in the producer countries is more the result of aggressive biotech industry marketing strategies than of benefits being derived from the use of the technology.

Moreover, GM crops have not shown any added benefits in tackling hunger in Africa. Most GM crops grown are destined for animal feed and none have been introduced to address hunger and poverty issues. In developing countries most GM crops are grown as cash crops for the export market, usually at the expense of food crops (Friends of the Earth, 2006).

The famous South African cotton farmers of the Makhathini flats in KwaZulu Natal, have been the flagship of Monsanto experiments. While they have tried to portray them as a success story, some researchers including Biowatch South Africa have been able to prove otherwise, with some farmers struggling to repay their loans. A majority of the farmers have not corroborated the much touted significant yield increases, leaving some observers to conclude that the farmers highlighted as successes are only an exception, and not the rule. There is also documented evidence[3] that the sweet potato project funded by Monsanto in Nairobi, Kenya failed, as GM yields were surpassed by non-GM sweet potatoes.

## Environmental Impact

Research has shown that a decline in soil fertility and erosion has been associated with the intensive cultivation of soya beans in other parts of the world. (FoE, 2006) Even though GM forest trees do not attract the same immediate health concerns as GM food crops, in reality they pose an even greater threat than do GM crops because they impact directly on the natural forests that are essential for the survival of the planet. Trees are larger and live longer, and therefore can spread transgenes further and wider, while their extensive root systems are a hotbed for horizontal gene transfer and recombination (Cummins J & Mae-Wan Ho, 2007)

**Table1: Potential Environmental Impacts of GMOs and their Consequences for Consumers**

| Identified Issue | Potential Negative Impacts on Environment | Consequences for Consumers |
|---|---|---|
| Mutation of genes once inserted into the organism | Organism could out-compete naturally occurring species<br><br>Possible reduction of yields | Food security risks<br><br>Unknown impacts on consumer's health if new strains of viruses arise |
| Interaction with wild and native population varieties | Modification of non-target crops – pose a threat to crop biodiversity. GM crops could compete with, and substitute crops of traditional farmers | Health risks<br><br>Reduced choice of seeds, undermine food security |
| Herbicide resistant genes going into weeds | More problematic weeds, require much stronger chemical control | Adverse health impacts due to chemical pollution |
| Widespread use of GM crops could lead to the development of resistance in insect populations exposed to GM crops. | Worse crop attacks by pests | Food insecurity as a result of reduced yields |

Source: Compiled from a CI Africa report by Hafashimana (2005)

The potential negative impacts of GMOs on the environment are summarized in Table 1 above. As a result of their impact on the environment, these potential negative impacts are likely to threaten consumer's food security status.

## Socio-Economic Impact Assessments

A number of tools can assist in guiding decisions on research, development and introduction of GMOs. The socio-economic impact assessment tool is a potential participatory tool for use in setting processes for bio-safety policy e.g. national bio-safety framework, bio-safety regulation or national law. It helps decision makers assess the potential benefits and risks of GMOs. (Elenita C. Dano, 2007) Thus, the assessments on GMOs should not be made when decisions have already been taken, but should be considered at all the different stages of the process: from contained experiments, to field trials, up to the time before commercial release.

## Implications for Policy

The different concerns raised above confirm that effective regulation of biotechnology requires engagement of different stakeholders within the national context. Consumers have a role to play in shaping both the technology and the regulatory systems for the technology, from the perspective of the basic consumer rights, as highlighted earlier, and as enshrined in Article 23 (Public Awareness and Participation) of the CPB. CI has played, and continues to play an active part in ensuring that consumers are informed and treated as important stakeholders in this issue. For African countries, because of shared cultures across national boundaries, one key component of engaging consumers in the GMO debate is ensuring that citizens are educated on the potential impact of uncontrolled cross-border movement of seeds or other planting material. There is, thus, a case for a regional approach to biotechnology regulation broadly, and specifically, for educating citizens about biotechnology.

The differences in technological capacities, and regulatory preparedness, amongst African countries, makes a regional approach as much a challenge, as it is an imperative. The following statement, made after the experience of the 2002-03 food aid debacle, epitomizes the challenge:

*'How, for instance, was Malawi to move maize donated by the United States, and thus obtaining [genetically-modified] Bt-maize, through Tanzania in mid-2002 in the absence of complementary biosafety protocols in Tanzania and Malawi, and in the absence of associated testing machinery?' – Steven Were Omamo and Klaus von Grebmer, 2005:2*[4].

At the same time, while acknowledging challenges such as the above, the reality is each country is sovereign and has an obligation to protect its citizens through effective decision-making and support systems. The following statement issued by the United Nations on 27th August 2002, following the food aid crisis acknowledged that;

*'Concerns have been expressed in southern Africa about the unintentional introduction of GM maize varieties into the region as a result of plantings or spillage of whole kernel maize provided as food aid …' but further noted that 'Based on national information from a variety of sources and current scientific knowledge, FAO, WHO and WFP hold the view that the consumption of foods containing GMOs, now being provided as food aid in southern Africa is not likely to present human health risk. Therefore, these foods may be eaten…' before reiterating that …'The ultimate responsibility and decision regarding the acceptance and distribution of food aid containing GMOs rests with the governments concerned, considering all the factors outlined above' (United Nations, 2002)[5].*

For poor countries; battling to feed their populations in the backdrop of unprepared regulatory systems, and in the face of powerful corporate actors, the challenges in making the right decisions are not less enviable. In these, food aid scenarios, there are contentions that not enough is being done by donor countries to source food aid from non-GM sources, as confirmed by similar experiences in Angola and Darfur in 2004. This makes it difficult to separate food aid from the aggressive efforts by some countries to promote GM crops and foods in developing countries (Prendergast, 2004)[6].

The Economic Commission of West Africa (ECOWAS), in support of biotechnology, is currently geared to implementing its action plan, and thus far the recommendations of consumer organisations have not been fully incorporated into these plans.

In Ghana the presence of GMO rice attracted media attention and consumer organizations were able to alert consumers. However despite all the efforts to stop the rice from entering Ghana's markets, it later found its way to other markets in West Africa.

## Recommendations

- Countries should be free to exercise their sovereign decisions on imposing restrictions on GM food aid while not jeopardising the lives of their citizens.
- Hence, it is imperative that partners, donors and stakeholders respect international law, regional guidelines and national regulations and restrictions imposed on GM food.
- Donor partners should respect the choices made by food aid recipient governments, providing GM-free foods and alternatives such as cash in kind needed for own purchases, or for cash transfers to targeted beneficiaries.
- Implementing bio-safety laws and harmonisation of policies related to the movement of foods across borders becomes important in addressing the challenges and crises that may arise in the regions and in the continent as a whole.
- Civil society organisations are key stakeholders in GMO policy processes, starting from development of the policies right through to their implementation,

monitoring and evaluation. They play a crucial role in raising consumer awareness by providing information and through their advocacy for social and economic justice to small farmers and indigenous people.

African countries should move fast to develop bio-safety polices and GM-related legislation for consumer protection, with labelling laws that give consumers choices.

## The Consumer Movement's Key Demands:

- Consumers must have a choice.
- Consumers must be informed via unambiguous and clear labelling. We are demanding mandatory labelling of GM foods.
- Governments must get their houses in order and formulate comprehensive and unambiguous bio-safety bills.
- Liability for use of GM foods rests with the originator (multinational corporations) rather than the end user (consumers and African farmers).

## Conclusion

Since no known benefits from this technology have been derived by consumers, small farmers and the environment, there should be more emphasis on alternatives normally available to farmers, and which can be easily adapted. Consumers have the right to know what they are eating. Therefore appropriate labelling of goods gives them the power to make informed choices based on safety and environmental friendliness, while addressing ethical and religious concerns.

The African consumer's food security and livelihoods are threatened as farmers are denied access, or are required to pay a fee for the patented seeds. (Muchopa C. 2005) This also proves that no significant economic benefits have accrued to the majority of Africa's small-holding farmers.

African consumers have been at the receiving end of GM food, as food aid and GM imports enter the countries undetected, and these food items are forced on unsuspecting consumers. Several tests done by SAFeAGE in South Africa have revealed that some foods contain GM ingredients but are not labelled. Other African countries have also reported GM foods on their store shelves. Since most countries are evaluating such technologies to improve crop yields, it is also important that socio-economic and environmental effects are taken into consideration. This will address consumer concerns as well as safeguard the environment and protect small farmers and the rights of the indigenous groups.

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[1] *(Source: International Service for the Acquisition of Agri-biotech Applications, July 11 2008 Bulletin)*

[2] The following countries had legally-binding frameworks as of October 2008: Burkina Faso, Egypt, Malawi, Mauritius, South Africa, Zambia and Zimbabwe (source – Mugwagwa J T (2008), PhD Thesis, The Open University, UK)

[3] e.g. see http://www.organicconsumers.org/monsanto/africapotato020204.cfm

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# 2.2 International Lobbying on the Cartagena Protocol

*Rudolf Buntzel*

Since 2006, the EED, along with some of the authors of this volume, has been involved in influencing negotiations on several topics addressed by the International Convention on Biosafety, known as the Cartagena Protocol. At the Meeting of the Parties in 2006, in Curitiba, Brazil; the so-called "MOP III", the main topic was the documentation requirements on GMOs traits in bulk shipments, which are mainly cereals and other types of animal feed. Two years later, at the Meeting of the Parties in Bonn, MOP IV, the major topic negotiated was an international regulation on liability and redress. Both topics are central to the control of genetic engineering. A common solution that would be internationally binding on the parties, is a prerequisite for many countries, before deciding whether genetic engineering and international trade in GMO foods and feedstuffs is acceptable.

The EED, our partners and other NGOs active in monitoring the Cartagena Protocol negotiations are all working to achieve the highest standards of biosafety possible, with the hope that GE can then be restricted by the precautionary principle. For the negotiations in Curitiba, this meant that we opted for requiring strict documentation of all GMO traits that could possibly be found in a cargo shipment. This would allow importing countries to restrict the entry of GMOs to those authorised in the importing country. In matters of liability and redress we fight for full and strict liablility on all damages that occur from GMO introduction, including socio-economic damages.

## Conference of the Parties at Curitiba

## The Course of the Negotiations

The NGO lobbyists at MOP III made a good effort to prevent a pro forma decision on documentation that would not oblige the GMO exporting countries to meet any specific requirements.

The delegation from New Zealand was the big stumbling block to any progress in negotiations, as they resisted any kind of obligatory transparency. Shortly before the meeting, the representative of the German government had asserted confidently, “Don’t imagine that you can win the New Zealanders over just like that! They have a hotline to Wellington. They haven’t just been waiting around for their vote.” How true! And yet, it wasn’t. For by the next day the New Zealanders were no longer a problem. This happened because, during negotiations on the Cartagena Protocol, through a joint effort by many NGOs, Greenpeace activists in Curitiba managed to get a letter published in major newspapers in New Zealand with the help of Greenpeace New Zealand. In it, the New Zealand government was charged of being an accomplice to the USA at the international level and accused of rejecting legislation for international identification of genetically engineered products, although New Zealand itself has strict domestic identification guidelines. The letter was printed in editorial columns in several New Zealand newspapers that day. This embarrassment led to new directives being issued from Wellington.

It appeared that a year-long blockade on negotiations to implement Article 18.2 of the Convention on Biosafety had been resolved. We thought that now nothing stood in the way of the obligation to disclose what GMO properties are present in international shipments. The path seemed clear after the Brazilian government’s position had been overturned the day before. Lula himself had stood by the side of his Minister for Environment, Marina Silva, and broken the resistance of the Brazilian bio-fuel lobby to any documentation of GMOs -as represented by his Minister for Agriculture Rodriguez

But far from it! Although the USA is not a party to the Cartagena Protocol, it sent its remote-controlled cruise missiles into battle. Suddenly, Paraguay misread a text, right after it had been handed to the national representative of Paraguay by Argentina. This was pretty obvious, because it happened right in front of the conference members. Argentina does not have the right of motion as it is not a party to the Convention; it has not ratified the Convention, although it is a signatory to it. The baton of rejection was passed on by New Zealand. Until that point, Paraguay had not had spoken to the subject. It was embarrassing enough that the delegate misread the unfamiliar text, clearly revealing Paraguay’s subordinate role; instead of “Biosafety Clearing House”, he read: “Biosafety Cleaning House”. But the rest of the delegates must have choked on their laughter when Mexico then suddenly appeared from nowhere and withdrew its support for the finished text, taking over the blockade from New Zealand and Paraguay.

Mexico’s move was a tough one for the negotiations. We were not very successful in changing Mexico´s position in spite of the fact that the next morning a text was read out on 30 Mexican radio stations accusing the Mexican government of blocking consensus. This initiative was possible because a staff member of the Latin American network of free radio stations, AMARC, was part of the EED-NGO team to Curitiba.

However after a hard struggle, a solution that prevented the failure of the conference was reached at the last minute. It was not much of an agreement, but at least the conference did not stall. Although this compromise did not meet NGO demands, it was considered better than nothing, which would have put the entire treaty at risk.

The Cartagena Protocol now hangs in the balance. Although 153 countries have ratified it thus far, the actual users of genetic engineering have not. And they- especially the USA, Argentina and Canada, are in fact fighting the protocol with every trick in the book. For example, the USA has openly warned the Philippines not to ratify the protocol if they want their good relations with the US to continue. The WTO judgement on the genetic engineering dispute, launched by the USA against the EU's supposed ban, disallows the defence of the EU as it had been based on the Cartagena Protocol as an international standard. For if the plaintiff in a WTO dispute is not a party to the international treaty the defendant bases their case upon, then it appears that the treaty cannot be used as justification, even if it is the only international standard relevant. Because of that ruling, the USA, Argentina, Canada, etc. do not need to worry much about the Cartagena Protocol. They can just refuse to join the Cartagena Protocol and then attack every country that is following the precautionary principle. They can then adopt their own version of "an appropriate safety level" in genetically engineered food in the world. It is a neat pretence, for they are the ones distributing genetically engineered goods around the world; and thus the plaintiffs in all disputes over genetic engineering.

## Documentation Requirement for the International Transport of Goods

So what has been decided? Only those GMOs in international trade, whose identity is known, need to be identified. In the case of cargo deliveries, where it is not known whether they contain traces of GMOs, it is sufficient to simply identify them with the tag 'may contain GMOs.' Thus countries that have not implemented any identity safety systems for food, which is the case in all the countries using genetic engineering, are not required to disclose the identity of their exports. According to the compromise, this will hold for a transitional period. And now we'll be waiting until the cows come home. Brazil wanted a transitional period of 4 years for this 'may contain' solution in the treaty, thereafter it should vanish completely from the radar screen. Now they are saying that the exclusion window of 'may contain' will be re-negotiated at the 6th Meeting of the Parties at Cartagena in 2012. It is debatable whether the exclusion will then cease, because only 'a decision will be considered.' It couldn't be vaguer.

Thus 'unintentional contamination' need not be listed, if it relates to contamination beyond the species boundary. Thus, for example, if a shipment of maize is identified as Bt10 maize, but accidentally also contains Bt11 maize, then this must be identified. However, if transgenic segments of a soy strain are present, identification is not necessary, even if these have been identified. As no risk thresholds are mentioned, the risk thresholds of the importing country apply. The NGOs are not altogether satisfied with this point.

## Assessing the NGO Lobbying Efforts

As NGOs, we campaigned well. We could not do any more. Unfortunately, the big Via Campesina Demonstration in front of the gates of the exhibition halls received very little attention. The conference participants were in a world of their own, well screened from the outside world. Unfortunately, it seems there is hardly any real alternative to lobbying inside the conference proceedings.

Together with kanalB, the EED had organised video coverage of the proceedings inside and outside the venue for the conference. The daily press reports, news and texts, which were also published on the internet, were the only reporting in Germany about the Conference, because the European media were not there. The website coverage was in English, German and Portuguese. The 25 short videos and texts can be viewed at: www.biotec-trade-watch.org.

## The Results of MOP IV in Bonn

The Meeting of the Parties to the Cartagena Protocol (MOP IV) took place in Bonn from 12th to 16th May 2008. It was intended that MOP IV in Bonn should bring to a close the negotiations on the liability regime. That did not happen. Nevertheless, although the negotiations were interrupted, they did achieve some results and were not declared a failure. Even that can be considered a success, when one considers the obstacles some countries and the industry put in the way of the negotiations. Two further meetings were agreed upon, and a new fixed new goal was set that the matter would be concluded at the next Meeting of the Parties in Nagoya, Japan, in 2010.

The Bonn negotiations at MOP 4 were dominated in particular by two events. First, 80 countries formed a group calling themselves 'The Likeminded.' This group reached an agreement on the cornerstones of a future liability regime. Comprising of mainly African countries, small island countries, Malaysia and Norway, this group represents proponents of a clear and binding liability provision for GMOs in international trafficking. Their proposals now form the basis of future negotiations.

The second event at Bonn was a proposal from the Life Sciences Industry. The six big companies of this industry presented a 'compact,' which was intended to replace a binding national provision. In its place, they said, private industry should step in with a voluntary liability provision, whereby the companies themselves would determine the implementation and rules of liability. The proposal was introduced with the warning that failure to accept it would lead to the private sector's refusal to make any further offers of collaboration. The 'compact' would be a treaty for the companies alone. They would make a fund available for compensation of 'acute damage by their products.' However, the conditions – especially the definition of 'damage' – were phrased in such a way that it would probably never come to a case of liability.

Following heated discussions this compact was finally rejected by the majority of the delegates, although some countries were tempted to accept it, among others even the chairperson of the negotiations. This made the negotiations very difficult. But the industry advance meant that the 'Group of Likeminded' was better able to make its mark simply by distancing itself from the industry proposal.

The cornerstones of the 'Likeminded Countries,' which now form the basis of negotiations, are the following: 1) Countries may implement their own national laws on the liability regime. While doing so, they should adhere to international guidelines that list the elements to be regulated. These guidelines are now being negotiated in the future negotiation process. 2) Regulations are being introduced, according to which national laws will be internationally recognised and foreign legal rulings will also be applied to national treatment. 3) A clause will establish that guidelines are monitored after a period of 3 years, so that, if necessary, they can be made binding.

These decisions represent a compromise between those countries that definitely want a binding international regime and those that definitely do not. Japan, New Zealand, Peru, Paraguay and Brazil are the main countries against a binding provision. In formal terms, a two-thirds majority is required for the adoption of codicils to the convention; but countries do not have to enter into supplementary treaties. However, after intensive discussions with the dissenters in small groups, these countries were gradually brought on board, so that at least the negotiations have not been blocked.

Japan, in particular, showed resistance, although it is a net food importer and it would actually be in its own interests to support a strong liability regime.

However, the countries opposed to a strict liability regime have also been able to bring their reservations into the final declaration. Accordingly, a final treaty would forbid any discriminatory trade practices from being legitimised, would not allow international imbalances to be frozen, would forbid any new trade barriers from being introduced, forbid obstacles being put in the way of science and technology and should be placed in the context of the fight against famine. The reservations could scupper every treaty. Will the torpedoes actually detonate the course of the negotiations? We will find out in Malaysia and Mexico, where the next two interim negotiations are due to take place, before moving the final resolution of the issue to Japan in two years, at MOP V.

The negotiations over the liability issue dominated the whole Meeting of the Parties, although other topics were also on the agenda, which are important for developing countries, for example, the topic of building up capacity, improving the functioning of the biosafety clearing house mechanisms, obligations to notify, the issue of fund raising, developing public awareness, etc.

Much to the disappointment of the NGOs, postponing the decision over the liability provisions also means that the bigger, still open, topic of the Cartagena Protocol, the definition of 'socio-economic criteria,' has been ignored. Without it, it will make it difficult even in situations where liability is to be determined, to find out what constitutes the 'socio-economic damages' that must be redressed. But they also play a role in the approval of GMOs, in monitoring and in the coexistence with agricultural systems that wish to remain free of genetic engineering.

## Impact of NGO Lobbying Activities

The NGOs declared that the industry proposal was an unsuitable attempt to transfer law and responsibility from the legislative sphere into private hands. They considered the proposal to be an empty promise capable of undermining the whole negotiation process. This declaration, in the form of a flyer, was distributed widely among the negotiating leaders and the international media. It found broad agreement among a large number of governments, who went along with the concept. The response from the press was overwhelming. The media coverage, including many interviews with the NGO representatives, then led to the industry being exposed and its withdrawal of its proposal. After they failed, most of them left the conference.

The NGOs also did their best to turn the Japanese position around. To do this, they chiefly made use of the fact that Japan is the host country for the next Meeting of the Parties MOP V. Posters appeared with 'Japan – the hostile host' and 'Anywhere but Nagoya' (the site of the next meeting). Later, compromises did appear in the final text, which hinted at Japan adopting a conciliatory stance. At any rate, it drew attention to the fact that nothing is adopted until everything is approved.

Running parallel with MOP IV was the NGO Conference 'Planet Diversity,' which took place in the direct vicinity of the official conference. More than 700 representatives of civil society from 100 countries took part. Many were simultaneously attendees of MOP IV and wandered to and fro between the Meeting of the Parties and the NGO conference. Never before, was such a large presence of civilian society seen at a Meeting of the Parties to the Cartagena Protocol. Through their attendance, they demonstrated the strong interest of the world in matters dealing with regulation genetic engineering. The technical legal questions thus took on a political dimension and moved out of the niche of pure jurisprudence.

A large, colourful demonstration on the opening day of MOP IV with about 10,000 participants, who passed in front of the gates of the conference building and held their rally there, ensured a lively, political mood from the start. Part of the demonstration procession included a parade of about 50 tractors draped with colourful banners and fantastic structures. A big open-air festival after the demonstration with lots of music, hundreds of stalls and exhibitions ensured a relaxed, happy atmosphere, however fully alert of the importance of the GM issue.

It is a fact that, since MOP IV happened in Bonn, the critics of genetic engineering who are pursuing the fight in their own respective countries have recognised now that the Cartagena Protocol is an important, political arena.

The EED and its partners in the Joint Advocacy Project, some of whom have written articles for this volume, played an important role both within the conference event and in the many side events. MOP IV, the side events and interviews with the active members of the JAP, involving groups from all continents, are also well documented in video clips and can be viewed at the EED's homepage:

http://www.eed.de/de/de.col/de.sub.45/de.sub.news/index.html

# Assessing the Socio-economic, Cultural and Ethical Impacts of GMOs[1]

2.3

*Elenita Daño*

## Introduction

Socio-economic, cultural and ethical considerations related to the use and release of genetically modified organisms (GMOs) are important aspects but have received less attention than the risks to the environment, health and biodiversity. Their importance has been recognized by the international community as socio-economic considerations have officially been taken on board the Cartagena Protocol on Biosafety.

While governments shy away from the issue, since it is an issue which is hard to capture scientifically, the topic is very important to civil society everywhere.

Article 26 of the Protocol on Socio-economic Considerations says that: "1. *The Parties, in reaching a decision on import under this Protocol or under its domestic measures implementing the Protocol, may take into account, consistent with their international obligations, socio-economic considerations arising from the impact of living modified organisms on the conservation and sustainable use of biological diversity to indigenous and local communities; 2. The Parties are encouraged to cooperate on research and information exchange on any socio-economic impacts of living modified organisms, especially on indigenous and local communities."*

While the Protocol has recognized that there are socio-economic considerations arising from GMOs, and that these may be taken into account in biosafety decision-making process, research on socio-economic considerations – and thus scientific evidence - is not a requirement for decision-making.

In order to give meaning to this provision, tools have to be developed and applied to guide decisions when introducing GMOs.

One such potentially powerful tool is the socio-economic impact assessment (SEIA), which is adapted from the existing, mature tools used in environmental impact assessment.

SEIA can help in assessing the potential consequences of a particular technology that is being introduced, on various aspects of the society. It is a participatory assessment tool which maps local knowledge in a particular societal context where a new technology will be introduced, to help decision-makers weigh the potential benefits and risks of GMOs to different socio-economic spheres. It entails the involvement of different actors/stakeholders and a plurality of aspects in the assessment.

## What to Assess?

Society is a complex social system that has evolved in specific contexts where economic, political, social, cultural and ethical spheres constantly interrelate with each other in an intricate manner. Below are some components of socio-economic considerations that have been identified in an attempt to capture this complexity, and which may be potentially impacted by GMOs.

## 1. Economic Considerations

### *Control over Tools of Production*

In the context of GM crops, a control over seeds and the accompanying inputs that complete the technology needs to be the core consideration, for any socio-economic assessment. This factor gains importance, bearing in mind the lessons learnt from technologies such as the Green Revolution, which reinforced income inequality, and wealth distribution in rural areas. The key questions that need to be addressed are: Will the dissemination of GM seeds provide opportunities for poor farmers to have some control over the tools of production, or will it further entrench control by particular segments of the community over farm inputs, processing and marketing?

### *Income Security*

The impact of GMOs on farmer's net income is another important consideration. Economic cost-benefit analyses, which take account specific farming practices and conditions of farmers who have adopted the technology would be useful. Basic questions about the costs of GM seeds and other required inputs and their share in the total cost of production should be posed, along with potential net income (or losses) that farmers can expect from using the seeds. Hidden costs such as environmental and health effects should also be considered.

### *Income and Wealth Distribution*

Companies that develop GMO products usually charge higher prices for their products such as GM seeds, with the intention of recouping their investments on research and development. Such pricing would tend to favor the richer farmers who can afford the higher cost of seeds. Assuming that the company's claims are true, with regard to the benefits of the GM seeds, i.e. their professed insect-resistant or herbicide tolerant properties, those who benefit from this promise are the rich farmers who can afford these seeds and who already have a relatively high income. Such a situation would expectedly aggravate the problem of income inequality and wealth distribution, especially in the rural areas.

### *Employment*

Utilising rural labour is a major economic concern, especially in developing countries where widespread rural unemployment is a perennial problem. For instance, the introduction of herbicide-resistant GM crops that eliminates the need for weeding, or tilling of the soil during land preparation will have a potentially grave, long-term, impact on rural labour, as less labour requirements mean less employment opportunities for poor agricultural workers.

### *Rural Labour*

The bodies and skins of labourers working in the fields are directly exposed to plants. No equipment or special clothing is used to protect them. There is enough proof that GM plants, like those of the Bt technology, which are toxic to insects, also effect the skin and health of workers. The new chemical treatments that often go along with the GM technology, and used on GM crops, will have their impact on the health of the users and labourers.

### *Markets*

Prices of agricultural commodities are highly sensitive to, and dictated by supply and demand. GMOs may affect market behaviour. Developing countries, whose economies are highly dependent on the production and export of specific agricultural products, are particularly vulnerable. Foreign markets could erode, if the exporting country cannot guarantee that their commodities are 'GMO free.' Japan, for instance, threatened to stop the import of Durum Wheat from the USA, when Monsanto's GM variety of Durum gained authorization. Because of the danger of losing the Japanese market, the US farmers asked Monsanto to refrain from commercializing this variety.

### *Trade*

With regard to trade, a major issue for developing countries; should they decide to venture into commercial production of GM crops, is their ability to compete in the international markets. In order to compete with the commodities of bigger and wealthier countries in the export market, developing countries must meet high international standards. Many find it difficult to comply with such sanitary and phytosanitary standards, thus jeopardizing their export prospects.

### *GMO Contamination and Organic Cultivation*

The various contamination cases that have been brought to light suggest that the problem is very real. Pollen from GM crops has been found to have traveled long distances by wind or through insects, making co-existence a challenging task. GMO contamination of conventional crops, and of wild and weedy relatives, poses serious threats to biodiversity and the genetic base for long-term food security.

### *Food Security*

For developing countries; where agriculture is a primary activity that ensures family subsistence and provides food supply to the domestic markets, a key concern that needs addressing is the impact of GMOs on long-term food security. The majority of the GMOs commercialized worldwide, are mostly intended for animal feed and not usually considered food crops. Genetic engineering is now entering the development of more effective energy crops or pharmaceutical crops. If these new GM crops are cultivated in the developing world, which partly will be altered food crops, household food security faces the threat from conversion of land areas traditionally planted with food crops to the production of commodity crops for industrial use, energy or animal feed, for export. A sound socio-economic impact assessment should therefore examine the effect of the adoption of GM crops due to land conversion and substitution of food crops for non-food purposes, as this may drive up food prices. The region’s food crops might be modified by pollination into commodities, which are not fit for human consumption.

### *Food Aid*

While ensuring long-term food security remains a great challenge for countries, many poor countries are confronted by emergency situations that inhibit farmers from producing their own food, particularly in areas affected by wars, natural calamities, drought and famine. In such circumstances, countries may have to depend on international assistance for their people’s survival. If the emergency assistance comes in the form of food aid containing GMOs, countries will be confronted with an ominous decision with regard to accepting such aid.

### *Intellectual Property Rights (IPRs)*

GMOs and GM products that are commercially available, or even those that are still being developed, are protected by IPRs owned by the companies and institutions that developed them. There is concern that the proprietary stake of companies over these products will result in concentration of the technology in corporate hands and therefore control over production. IPRs may also hamper the free flow of information, knowledge and genetic materials that are the basis for research and development efforts in public universities. As such, corporate control over the technology could severely limit the potential of public institutions to pursue research that serves the interest of the poor- whose needs are often ignored.

## 2. Social Considerations

### *Impact on Farmer's Rights to Save Seeds*

GMOs could impact on the traditional practices of farmers whereby they save, reuse, share, exchange and sell seeds saved from previous harvests. This is especially relevant in developing countries where such practices are common among farmers. The traditional seed-saving practices of farmers are widely regarded as the foundation of the immense genetic diversity in agriculture today. Thus, developments that may limit this practice, such as stringent application of the IPR system on seeds, are potential threats to the long-term food security of rural communities and countries.

### *Impact on Women*

The impact of new technologies on women and gender roles should also be assessed. History has shown that the introduction of modern agricultural technologies have further led to the marginalization of women in rural areas and their roles made more invisible by the innovations, which are designed mainly for men.

### *Consumer Concerns*

While GM technology may produce cheaper products for consumers through higher and more efficient production, consumer acceptance of GM products in the market, however, does not only hinge on price. Other factors such as cultural and ethical values and perceptions about the product with regard to health and environmental safety, also play significant roles, and need to also be assessed.

## 3. Institutionalising the SEIA

Regulators should be mindful that most of the socio-economic consequences of GMOs are likely to be irreversible and uncontrollable, once the products have been released into society.

As such, SEIA needs to be integrated into the biosafety decision-making policy and processes, such as the national biosafety framework, biosafety regulation or biosafety laws of the country. SEIA should not be limited to an assessment *after decisions* on GMOs have been taken, but should be integrated at different stages of the biosafety process – from the contained experiments, to the limited field trials up to the period prior to the commercial release of GMOs.

To be effective in guiding decision-making concerning GMOs, SEIA needs to adopt a bottom-up approach involving all stakeholders who may be affected by GMOs. However, active participation can only be expected from an informed public, which underlines the need for public awareness, transparency and public access to information. Awareness-raising efforts should also extend to broadening the public's perspective on alternative technologies and options.

SEIA clearly involves a multi-disciplinary assessment. Moreover, context-specific socio-economic assessment tools need to be developed with inputs from different stakeholders. In general, the processes involved in the SEIA, and how they are actually implemented would determine the credibility of the exercise for taking decisions on GMOs.

[1] This briefing summarizes the following publication - Potential Socio-Economic, Cultural and Ethical Impacts of GMOs: Prospects for Socio-Economic Impact Assessment, by Elenita C. Dano, TWN Biotechnology & Biosafety Series 8, 2007.

# Part 3

## Why we don't Need GMOs

# First Steps in a Peasant Sustainable Agro-food System- an Experiment from Mexico

3.1

*Catherine Marielle, Lucio Diaz and Marion Poinssot*

## Peasant Agriculture and Organic Agriculture

In Mexico, small-scale peasant agriculture continues to prevail. More than 75% of agricultural producers own less than five hectares of land. Many of them are from indigenous groups,[1] who possess traditional knowledge passed down through the generations, and who maintain the *milpa* tradition of growing different crops together. Thus maize, beans, chilies and other basic crops in the Mexican diet are grown in the same plot.

Among the policies that have dismantled peasant agriculture and marginalized the rural population over the past 25 years, has been the Mexican government's encouragement to farmers to incorporate external inputs like agrochemicals and hybrid seed into traditional agricultural systems. A significant share of traditional lands is located on the slopes of hills and mountains that are dependent on rainfall. However, many small producers have been unable to access these inputs and continue to use their customary methods, generally in very small, eroded plots of land. Others have chosen to defend and protect their territories, their lands and seeds, reviving and refining agricultural techniques that can be traced back hundreds of years. At times, they have support from agro-ecological alternatives that help in overcoming certain socio-environmental limitations. All of them are *de facto* organic producers, most grow crops for family consumption, and some sell at local markets as well.

There is also an emerging organic sector that has managed to position itself in more favorable market niches and to obtain national and international certification. Some large agro-exporters have consolidated their organic production in northern Mexico, while thousands of small farmers organized in different ways have placed their products in European and US markets. However, not all producers are able to obtain organic certification, sometimes accompanied by a fair trade label, due to the high costs involved.

99.5 percent of Mexico's organic producers cultivate an average of three hectares, and are grouped into organizations. Approximately 58% belong to an indigenous group. The statistics point to the social importance of the organic sector, which has gradually expanded from growing coffee to producing fruits and vegetables, milk products, maize, rice, beans, soybeans, etc.

In 2000, a total of 102,802 hectares were dedicated to organic agriculture in Mexico (43% in Chiapas, and 27% in Oaxaca, both southern states with the highest growth rates in this sector, followed by Michoacan, Chihuahua and Guerrero). There were approximately 47,987 organic producers in Mexico, with 60% of them focused on growing coffee. Six years later, more than 50,000 organic producers were growing 50 different products on a total of 250,000 hectares. And currently, there are over 83,000 producers growing organic products on 310,000 hectares.[2]

Despite some interesting attempts to create new mechanisms for distributing food directly from producers to consumers, and to create some market niches for fair trade and organic products,[3] only 15% of the certified organic food produced, is consumed in Mexico. The rest are exported.

The organic sector is growing rapidly, at an annual rate of 27%. A Law on Organic Products has been passed. However, this sector is exposed to very high risks, from the rapidly expanding agro-chemical and transgenic contamination, and due to the negative repercussions from the international financial crisis, which is affecting exports and steadily reducing domestic purchasing power.[4] While it is true that the high cost of chemical fertilizers could signify an opportunity to strongly promote organic agriculture, many peasants in Mexico are currently demanding government support for obtaining larger quantities of artificial fertilizers in order to sustain and increase their production.

The economic model of Mexico is fomenting the country's food dependency, as well as the chemical and transgenic contamination of the environment (water, soil, seeds) and food sources. Public policies must be urgently implemented to encourage sustainable production and to defend the rights of all Mexicans to healthy, safe and diverse food. They should respect regional culinary traditions; and recognize the right of peasants to continue to be peasants, while encouraging all of society to increase its environmental awareness and express its solidarity toward peasants—who are the true guardians of biodiversity, agricultural diversity and traditional knowledge.

There are thousands of agro-ecological initiatives throughout Mexico that are applying these rights and principles, with or without organic certification. The results of these efforts should be demonstrated to the public and to decision-makers.

## A Peasant Agro-Ecological Experience

We will briefly describe and analyze six years of experience in a regional Sustainable Agro-food System pilot project, conducted in the Central-Mountain region of Guerrero.

These experiences have been recorded by two sister organizations, the Environmental Studies Group (*Grupo de Estudios Ambientales*) and the local Social Solidarity Society *Sanzekan Tinemi*. These two organizations, together with a hundred rural men and women from 15 communities, have been formulating proposals for facilitating the transition towards ecological agriculture, with a commitment to the people, to the land, and to the production, distribution and consumption of healthy food. Our aim is to consolidate the organization of families, groups and communities, and to strengthen their capacities and enhance the management and governance of their territories. Mechanisms like peasant experimentation, farmer-to-farmer exchanges, and dialogue between knowledge systems are being employed to achieve the goals.

## The Concept of Sustainable Food Systems

In order to begin collaboration with these small Guerrero producers, most of whom are subsistence farmers, it was important to first recognize and value their shared background- the traditional agricultural system with ancient roots known as *milpa*, which is based on a complex, cultural and biological framework; the traditional *scientific* knowledge maintained by peasants for generations; and other teachings oriented toward understanding what is called *campesino* science[5] — to learn from it and enter into dialogue with it, in order to be able to work in the countryside, alongside the peasants.

The concept of the Sustainable Agro-Food System (Si*stema Alimentario Sustentable – SAS*)[6] is very useful in articulating the experiences and relationships among the various stakeholders in the agro-food chain.

## The Central-Mountain Region of Guerrero

A high percentage of the forests, rainforests, scrublands and arid areas of Mexico are located in *ejidal* and communal lands, and dependent on systems managed by peasants[7]. This means that those who have taken responsibility for the use of the natural resources in these ecosystems are mostly small farmers and indigenous peoples. They contribute to conserving these resources through many practices, norms and regulations coordinated by the community's institutions.

The region where we are working includes the Chilapa, Zitlala, Ahuacuotzingo and Mártir de Cuilapan municipalities. It is an area where indigenous people have taken refuge, and is currently considered among the country's most marginalized areas. It is located in the Balsas River basin, in the center of the state of Guerrero, where the altitude ranges from 700 to 2,500 meters above sea level. The terrain is very rugged and the vegetation includes pastureland and deciduous tropical and oak forests. The population, of Nahuatl origin, lives in very precarious conditions with 35% lacking land, 32.5% without remunerative employment, and more than half migrating temporarily every year to complement their income. The majority of those who own land have less than two hectares.

The region is confronted with serious social and environmental challenges: a dwindling labor force due to migration, the loss of traditional knowledge and technologies as the elderly die and young people are absent; the accelerated loss of vegetation, soil and water due to mismanagement and pressure on resources; extended poverty; the lack of public policies aimed at improving living conditions in rural areas; and community and inter-community conflicts.

## The Principles of the Work and Objectives of the SAS Regional Pilot Experience

We base our work on the experiences accumulated in facilitation, research-based action, local-regional participative diagnostic assessment and participative planning.

A fundamental starting point is to understand the diversified livelihood strategies developed by peasant families and communities. They simultaneously manage a set of sub-systems including: an agricultural plot, family orchard, domestic animals, collecting and hunting, making and selling handicrafts, sale of products at local or regional markets, and working at jobs within and outside the region. They do not specialize, but rather administer their resources to manage all of these activities in a coordinated manner, while diminishing risks and guaranteeing their survival.

Another guiding principle is the recognition of the right of indigenous peoples and peasant communities to exercise control over their territories and natural resources. This involves respecting their self-regulating systems operated through institutions and norms.

The specific objectives, which have been enriched throughout the first six years, can be listed as follows:

- Incorporate agro-ecological practices in the production of food for the families involved in the pilot experience.
- Rescue and conserve the region's native seeds on site, working together with participating peasant women and men.
- Strengthen the organizational capacities of the people involved, to produce, process, commercialize and consume basic food products (maize, beans, tomato, chilies, squash), with sustainable practices and a gender perspective.
- Progress in developing a comprehensive approach to the sustainable management of micro-basins, where peasant families and communities carry out their agricultural activities and manage natural resources.

## SAS Stakeholders

Till date, approximately a hundred producers; both women and men and often entire families, participate voluntarily in SAS work and in testing agro-ecological practices in their land plots. These producers, who live in 15 communities in the municipalities mentioned above, are generally members of Sanzekan and are concerned about preserving their land, achieving their autonomy in relation to agricultural inputs, and eating healthy food. In most of the communities, there is a promoter who shares his/her experiences with neighbors and encourages them to test agro-ecological practices on their plots of land.

## Methodologies

Beginning with participative diagnostic assessment, the methodologies we use have been created and diversified along the way. We have highlighted some of them below:

### *Ecological Plot Planning*

One of the first methodological tools used was Ecological Plot Planning (*Planeación Parcelaria Ecológica*—PPE), which facilitated understanding the reality producers experience and helped learn how they imagined the future from their own perceptions. This tool consists of the following steps:

- Description of the land plot by the producer, through a sketch accompanied by detailed notes.
- Presentation by the facilitating team of different technical alternatives for resolving the problems detected in each land plot, such as: rainwater retention, soil conservation practices, organic fertilizers, plant insecticides, selection of native seeds, etc.
- An outline of a sketch of the land plot in which the producer illustrates how he/she would like to see it in five years and a matrix filled in with the work to be implemented each year in order to make the goal a reality.

The annual follow-up of the PPE process consisted of looking at which of the planned practices were actually implemented, what the results were and how the results were noted, thereby making it possible to define indicators in a participative manner.

All the participants agreed to test out different agro-ecological techniques in their fields. In addition, 20 participants established experimental plots, and agreed to observe the results on a regular basis and make comparisons, with the intention of turning it into a demonstration plot for promoting the use of agro-ecological alternatives.

### *Areas of Work*

Advancing toward a sustainable agro-food system requires opportunities for education and training, practice, reflection and the exchange of knowledge. Currently, the regional pilot experience is carried out in the following work areas: experimental land plots, collective seed bank, community and regional workshops, community assemblies, exchanges between peasants, events (rural fairs, food fairs, etc.), follow-up visits to land plots, annual evaluations and planning, *Video Andariego* (traveling film presentations to communities, to demonstrate regional projects, for entertainment and to initiate reflection), and *Jornadas por la Madre Tierra* (Mother Earth Days) based on activities for environmental education and reflection, with teachers, children and youth in schools. Community and regional promotion of the SAS program takes place in each of these work areas.

### *Transition to Organic Agriculture*

We organized many regional training and exchange workshops between 2002 and 2008, as well as dozens of field work sessions and on-site visits. In a number of communities, peasant families who did not participate in the project are also adopting the agro-ecological practices encouraged by promoters. We have symbolically named them 'the other SAS.'

Six years after the process was initiated, it is clear that the main incentive for peasant women and men participating in the SAS project has been reviving soil fertility. This "key" opens doors to other production alternatives, and to deepening and expanding the experimentation process. Since 2002, in order to monitor the adaptation and adoption of agro-ecological practices, the 20 experimental plots have been visited twice a year. It is during these visits that the most substantial concerns emerge, together with the achievements of experimenters and the adaptation of practices to family strategies for production and the availability of the labor force, materials, land, etc.

### *Rescuing and Conserving Local Native Seeds*

The creation and maintenance of a collective, experimental seed bank has motivated the gradual, collective learning about the importance of maintaining local landraces. Peasant men and women in the region have a better understanding of the risks of contamination by transgenic maize and the consequences for the diversity of maize, in its center of origin and genetic diversity. They are also aware now of the impacts of the North American Free Trade Agreement (NAFTA), and the effects of climatic change.

The seed bank is a technological as well as a cultural innovation that has evolved through a long process of discussions. Technical standards and agreements had to be established to get the seed bank working and secure its management. The project involved participative experimentation aimed at documenting the identity of the seed and its characteristics in relation to the agricultural practices used. We had to find out how the stored seed can best be conserved in different containers and protected using the different insecticidal plants from the region. This line of action in the SAS project has generated the most debate in the group of experimenters, and has helped reassess the region's agro-biodiversity. The seed bank was initiated with a spirit of experimentation with different techniques of seed conservation, and with a spirit of solidarity toward the peasants who had lost their traditional seeds. However community seed banks do not replace the role each family plays in carefully saving its own seeds, but complement it.

On the basis of these trials, we have systematically recorded the characteristics of five local maize varieties. We have also tested the effects of eleven plants and minerals for their insecticidal properties, in 47 different combinations.

Two significant achievements in our efforts to reassess native seeds have been: the visibility of the diversity of maize that still persists in the region, and the discovery of a *teosinte* variety (*Zea parviglumis*) in October 2006, a wild relative of maize, in a *milpa* field in the community of Ahuihuiyuco (Chilapa). It is known in that community as *acintle,* usually considered as a weed, it is removed or mixed with other plants as a fodder crop for cattle. The discovery of *teosinte* provided an opportunity to reflect, together with the farmers, upon the real origin of maize. It opened the understanding towards the claims that the region is a center of origin and genetic diversity for Maize. Consequently, everybody agrees it should be a territory free of transgenics.

Activities in the Peasant Management of Natural Resources, and in the SAS project have been progressively integrated into a regional program of comprehensive land use management, in which the basins are defined as the focus for coordinating actions. The fields in a process of transition to organic agriculture are mainly located in the basins and drain into ravines, creeks and rivers. Consequently, the agro-ecological strategies in these basins help to recuperate the quality and quantity of the region's water and soil.

## Some Conclusions Regarding the SAS Pilot Experience

The transition to organic agriculture and efforts to multiply Sustainable Agro-Food Systems in the region is not linear and not always explicit. It must be analyzed in its complexity, as part of the reality for peasants.

This experience was based on a trial and error process. It was constantly enriched through the analysis of reality and the effort to introduce changes. By recovering forgotten knowledge, through experimentation and engaging in participative research and exchanges, the situation improved. We wish to share this experience and discuss it in relation to other experiences, different and similar.

## Challenges in Achieving Sustainable Peasant Agriculture

It is vitally important that individuals, groups, and producer and consumer organizations in both rural areas and cities exchange their views and learn about other ways of producing, distributing and consuming food. It is fundamental that people work within their communities to analyze problems, make decisions and formulate development proposals, and that these be respected by authorities at local, municipal, state and federal levels.

It is absolutely necessary to recognize the value of Mexico's agriculture and its peasants, to safeguard the country's native maize varieties, to conserve agro-biodiversity, to promote self-managed, ecological peasant agriculture, to effectively defend Mexican territory as a center of origin and genetic diversification of many crops and defend it against the invasion of transgenics, to respect peasant and indigenous territories, and to fully respect the right of peoples to healthy, safe and diverse food.

The numerous agro-ecological experiences in Mexico cannot continue to resist the forces of the "free" market if efforts are not focused on building alliances among these initiatives.

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[1] Of a total population of 106 million Mexicans, 13 million belong to 62 ethnic groups. Based on the systematization of the experience "¡SAS! Una experiencia campesina hacia sistemas alimentarios sustentables", C. Marielle (coordinator), Manuel López, Marion Poinssot, Lucio Díaz, Francisco Méndez, Marco Díaz León and Jasmín Aguilar, GEA, 2008.

[2] M. Á. Gómez Cruz, R. Schwentesius R. and L. Gómez Tovar (coords), 2006, Agricultura orgánica de México. Mexico: Universidad Autónoma Chapingo, Consejo Nacional de Ciencia y Tecnología, Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación, Falls Brook Centre, Red de Acción en Plaguicidas y sus Alternativas en México, and Sojitz Mexicana.

[3] For example, the Mexican Network of Organic Markets and Street Markets (Red Mexicana de Tianguis y Mercados Orgánicos) in Mexico City and the cities of Oaxaca, Jalapa, Guadalajara, Tlaxcala, Puebla, Uruapan and Texcoco.

[4] It decreased 24.5% from December 2006 to August 2008.

[5] Concept developed by Maestro Efraím Hernández Xolocotzi, known as the father of ethnobotanics in Mexico.

[6] This concept was launched in 1995 by Karen Lehman of the Inter-American Network of Agriculture and Democracy (Red Interamericana de Agriculturas y Democracia—RIAD), which GEA contributed by creating it in 1992 and by promoting it in the years that followed.

[7] Social property embraces more than half of the national territory.

# Farmers Say No to Genetic Engineering in Rice – The Case of Bangladesh

# 3.2

*Farida Akhter*

## Introduction

The introduction of genetic engineering in agriculture, particularly in rice, is being resisted by the farmers of Bangladesh. They oppose it with the slogan, 'GMOs are not necessary.' They also ask why someone should try to insert the gene of a bacterium into a rice variety to control pests, whereas maintaining biodiversity in the farm landscape is the foolproof solution to prevent pest attacks and diseases. Bio-diverse agricultural practices and planting appropriate varieties in suitable ecosystems have been historically practiced in Bangladesh. Biodiversity-based, ecological farming practices are life-supporting and sustainable.

Bangladesh has a rich diversity in both cultivated and uncultivated crops. The country's biodiversity-based agriculture supports the survival of the people and brings them economic prosperity. As an agricultural system that has historically developed in a centre of diversity, it has also developed unique agrarian knowledge, technologies and practices which do not fit the modern industrial paradigm.

The introduction of GMOs would be ecologically and economically disastrous for Bangladesh. Bangladesh sustains a large population which depends for its nutrition and food security on uncultivated, as well as cultivated, foods. With the high incidences of genetic contamination of the environment, and increased use of chemicals, the GM crops pose a serious threat to the well-being of the people of Bangladesh[1].

The promises of pro-GM scientists made before the introduction of GM crops remain hollow and unfulfilled. Experimenting with GMOs is a potential risk for a country rich in biodiversity. In comparison, bio-diverse ecological agriculture holds more promise, and there is plenty of scope to integrate advances in modern biological science into the indigenous and local knowledge practices. All of the above goals can be achieved without manipulation at the genetic level.

# Rice is Life

Cultivated Rice (*Oryza sativa*) has been grown in Bangladesh for thousands of years. Rice is the most important agricultural crop in many Asian countries and is the staple food for the people of Bangladesh. Rice is an essential part of the culture, lifestyle and livelihood of Bangladesh. It is difficult to think of a farming family which does not cultivate rice. There are about 11,798,242 farm households, of which 52% operate small holdings- less than 3 acres of land, 11.65% operate less than 7.5 acres of land, and only 2% have more than 7.50 acres of land (BBS 2001). Most of the farm holdings, especially the small and medium holdings, cultivate rice for their own consumption. However, official statistics on the number of farmers is not available (UBINIG, 2004).

In Bangladesh, over 15,000 rice varieties were recorded in early twentieth century. The Bangladesh Rice Research Institute (BRRI) maintains a collection of over 5000 varieties. *Nayakrishi Andolon*, a biodiversity-based farmer's movement, has collected and propagated about 2300 varieties.

Bangladesh is the fourth largest producer of rice in the world with an annual production ranging from 17 to 19 million tons, covering 70-75% of the total planted crop area in the country. Rice makes up 95% of the cereals consumed, and supplies 68% of the calories and 54% of the protein in the population's diet. Rice production has a very clear division of labour between men and women.

Men carry out activities like ploughing, planting and harvesting. Once rice is harvested and brought to the household, it becomes the responsibility of women to do post-harvest activities like drying, husking and seed preservation. Women's knowledge, skill and experience in rice processing and seed preservation are the most valuable assets in a farm household.

Rice farming owes a lot to the close interaction between human beings and domestic animals and birds. A farming household is incomplete without cows, bullocks, goats and poultry. Rice cultivation provides fodder for cattle and poultry, and the animals in return give service through ploughing, providing cow dung for manure, giving food (meat and eggs) and extra income for the family.

For centuries, farmers have been cultivating different varieties of rice suited to various soil types, climatic conditions, different needs and taste. The diverse challenges of feeding the people and meeting the cultural and social needs are fulfilled through the collection and production of diverse varieties of rice. Local varieties of rice have beautiful names, based on their looks, smell, taste, nutrition, flood and drought tolerance, etc. In comparison, the farmers do not call the new introductions 'varieties,' as they are 'numbered,' and do not have any name by which one can know their characteristics. For them these are rice varieties, which companies are promoting for their own interests.

## The First Attack on Rice: High Yielding Varieties (HYVs)

In the early 1950s, the Rockefeller and Ford Foundations brought new technological innovations in rice to Bangladesh. The farmers were not consulted on the HYVs or on the 'Green Revolution.' The institutions came on their own initiative, promoting HYV rice production with many promises of solving the problem of feeding people. But now in 2008, it can be said without a doubt that the Green Revolution failed to feed the people.

The International Rice Research Institute (IRRI) was set up in the Philippines by Rockefeller and Ford in 1962. It developed the dwarf varieties, their height reduced from about five feet to three, to produce heavier panicles, or clusters of rice grain. They were called High Yielding Varieties (HYVs) without referring to the high 'inputs' associated with them. In order to promote the new technologies in rice, an affiliate institution of IRRI was set up locally in 1970 called the Bangladesh Rice Research Institute (BRRI).

Due to extensive promotion by the government, with foreign donor support, BRRI varieties now cover 52 percent of rice-growing areas, and account for 70 percent of the total rice production in Bangladesh. The government's Agricultural Extension Department supports farmers only when they cultivate high yielding varieties developed by BRRI. There is no support for research on local varieties, even though they have similar yield levels without additional inputs like fertilizers, pesticides and irrigation.

The HYV rice could show better performance in the early days of introduction because the land was still fertile. But the yield performance declined gradually, while inputs increased. According to Stefano Pagiola of the World Bank, "Unfortunately, there is increasing evidence that intensive agricultural practices may be degrading the natural resource base on which agricultural production depends. Yields of modern varieties, far from increasing, may actually be declining despite higher input levels." [Pagiola, 1995]

While rice production became more and more dependent on fertilizers, the effect on the genetic diversity of rice was severe. According to BRRI's own documents, the genetic diversity of rice disappeared from farmer's fields, and by 2002 the national gene bank of Bangladesh Rice Research Institute (BRRI) 'registered in accession' only 3661 local varieties out of a total of 5025 ( BRRI 2002).

## The Second Attack on Rice: Hybrids

The admittance of the failures of HYV rice came mainly to prepare the ground for the introduction and promotion of hybrid rice – a new attack on the traditional varieties. Instead of trying to find the causes of failures of so-called modern varieties of rice, the government, with the support of donor agencies, promoted hybrid rice varieties. The commercial seed sellers influenced the government to formulate the new seed policy of the Bangladesh Government to encourage the private sector to participate in the rice seed market by importing hybrid rice seeds from abroad and pushing them to the farmers. A special committee recommended the release, introduction and import of rice hybrid seeds, based on the results of limited trials for one season. But the government promoted hybrid varieties of rice after the floods of 1998, 2004 and in 2007 through micro-credit programmes and through the Agricultural Extension Department. Even though newspapers reported extensively about the failure of hybrids in the period of 2007-08, the government ignored these reports.

According to UBINIG-*Nayakrishi Andolon* research (Sobhan 2008), Boro rice cultivation in the dry season itself was interfering with the traditional agricultural system of producing a variety of crops suitable for this particular season. During the dry season, the traditional areas of pulses, oil seeds, spices, vegetables, potato, sweet potato and minor cereals were taken over for rice cultivation. In 1991-92, Boro Rice was cultivated on 6,511,000 acres land, which increased to 9,500,000 acres in 2002-03. The area under pulses and oil seeds dropped from 1,783,000 acres to 1,108,000 acres and from 1,334,000 acres to 988,000 acres respectively. This land-use transformation poses a threat to the nutritional and food security of the country.

Despite the fact that farmers were systematically bluffed by seed companies about the yield performance of hybrid seeds in the past, the government allowed commercial promotion of hybrid rice seeds without assessing their feasibility from the farmer's perspective. So far, no data points to positive performance. The government is also promoting monopoly in the Bangladeshi seed market for only four to five companies, allowing them to import a handful of hybrid varieties. Among the four companies, two are multinational corporations actively involved in the production of chemical pesticides.

## The Third Attack on Rice: GE Rice

The latest attack is through the efforts of the biotech companies to introduce genetically engineered (GE) rice in Bangladesh. The GE rice is in research stage for Abiotic Stress, i.e. for conditions such as salinity, drought and flood. These are: 1. salt tolerant rice for coastal regions; 2. flood-tolerant rice; 3. drought- and cold-tolerant varieties of rice; and on the grounds of nutritional traits, accumulated pro-Vitamin A (beta-carotene) in the seed endosperm tissue.

The salinity-tolerant variety is called Saltol, the flood resistant variety uses the Sub1 gene in the domestic high-yielding BR11 rice. The vitamin A-fortified rice is called 'Golden Rice,' using the BR29 rice. Both BR11 and BR29 were developed by the Bangladesh Rice Research Institute as HYVs of rice, but are now being given to biotech companies for genetic modification. According to a Reuters report dated 02.06.2008 quoting Mr. M.A. Salam, Research Director at the BRRI, 'the new types of rice, developed in cooperation with experts in India, the Philippines and the United States, have passed field tests and have been approved by Bangladesh's agriculture ministry for use by farmers'. [Reuters, 2008]

## Why Hybrid & Genetically Modified Rice?

Bangladesh needs neither the hybrid rice nor any genetically modified rice on grounds of 'higher productivity,' facing stresses such as flood, salinity, droughts and nutritional fortification. The traditional varieties have equal or better levels of productivity in comparison to the HYVs developed by BRRI for the Aman season as recorded below:

**Table 1: Comparing BRRI varieties with local Aman Variety**

| BRRI Variety | Seasons | Productivity ton/hectare | Local Varieties | Seasons | Productivity ton/hectare |
|---|---|---|---|---|---|
| BR-23 | Aman | 5.5 | Chand maloti | Aman | 5.32 |
| BR-30 | Aman | 5.0 | Rasun bhog | Aman | 5.17 |
| BR-33 | Aman | 4.5 | Mohini shail | Aman | 4.75 |
| BR-34 | Aman | 3.5 | Hizol Digha | Aman | 3.51 |
| BR-39 | Aman | 4.5 | Jhulan | Aman | 4.78 |
| BR-40 | Aman | 4.5 | Nil-kumari | Aman | 4.47 |
| BR-04 | Aman | 5.0 | Ganga Sagar | Aman | 5.26 |
| BR-5 | Aman | 3.0 | Fulkadi | Aman | 3.19 |
| BR-10 | Aman | 6.5 | 1. Nunia shail/ 2. Khaman | Aman | 6.37 |

While the HYVs need heavy inputs, the local varieties do not require any extra input other than labour. So in terms of net productivity, the local varieties are superior. In terms of productivity, there are local varieties of Boro Rice that have equal or higher yields as compared to the modern BRRI varieties.

**Table 2: Comparing BRRI varieties with local Boro Variety**

| BRRI varieties | Seasons | Productivity ton/hectare | Local varieties | Seasons | Productivity ton/hectare |
|---|---|---|---|---|---|
| BR-2 | Boro | 5.0 | Shete boro | Boro | 4.80 |
| BR-3 | Boro | 6.5 | Sonali boro | Boro | 6.85 |
| BR-6 | Boro | 4.5 | Shete boro | Boro | 4.80 |
| BR-7 | Boro | 4.5 | Golapi boro | Boro | 4.60 |
| BR-8 | Boro | 6.0 | Balanga | Boro | 6.30 |
| BR-12 | Boro | 5.5 | Boro digha | Boro | 5.30 |
| BR-15 | Boro | 5.5 | Kalo sayta | Boro | 5.45 |
| BR-28 | Boro | 5.0 | Turfan | Boro | 5.10 |
| BR-29 | Boro | 7.5 | Topa boro | Boro | 6.93 |
| BR-19 | Boro | 6.0 | Bowali boro | Boro | 5.85 |
| BR-45 | Boro | 5.5 | Kalo sayta | Boro | 5.45 |

The HYV Boro varieties need extensive irrigation which in turn requires diesel, electricity, fertilizers and pesticides, while local varieties are grown in the low lying areas, and therefore do not require any extra inputs.

The local varieties also include varieties resistant to drought, flood, and salinity. According to *Nayakrishi* farmers, there are at least 22 drought-resistant varieties grown in drought-prone areas, 17 varieties which can remain in submerged conditions grown in flood-prone zones, and 23 varieties which are salinity tolerant still grown in the coastal regions. For nutritional purposes, there are rice varieties as well as various uncultivated plants and vegetables that have good nutrient values in terms of iron, vitamin C, vitamin A and zinc.

Farmers in Bangladesh have been practicing their wisdom by cultivating rice for hundreds of years. The experiences of the *Nayakrishi* farmers who grow local rice varieties show that the cultivation of rice depends on the water level in the rice fields. There are no homogeneous land, water and soil characteristics which determine the variety of rice to be planted. In one area there is no water, in other areas there is constantly standing water. The HYV varieties cannot be cultivated in these diverse land, soil and water conditions. Thus farmers have been cultivating local varieties suitable for each specific geo-ecological condition. In the family, both men and women discuss about the variety to be cultivated.

The season of the rice is also very important. There are three different seasons for rice such as Aus, Aman and dry (Boro). During the Aus season only local rice varieties are cultivated. Farmers call it 'scarcity reduction variety' because the cost of production is minimal.

During the Aman (monsoon) planting season, local rice varieties are grown because most of the land is under water. During this season, the chances of floods are high. Therefore the farmers plant the traditional rice varieties which are flood water tolerant.

## Conclusion

The farmers of Bangladesh were never consulted when the modern varieties of rice, hybrid and genetically engineered varieties, were developed, introduced and promoted in their country. Bangladesh has traditional rice varieties which meet the agro-ecological challenges well, and have yields comparable to or better than the technological newcomers.

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# Agro-ecological Farming is a Real Option for Africa

3.3

## *Samuel Chingondole*

In Africa, especially in southern Africa, organic farming is on the rise. An important growth factor is the demand for organic products in the industrialised countries. There is also an increasing preference amongst African consumers for organic food in the wake of concerns raised about GMOs. Other reasons why agro-ecological methods are becoming more and more popular relate to the maintenance and rehabilitation of soil fertility on land threatened by degradation and erosion. Many farmers and other agricultural actors in Africa are disappointed with the technology of the 'Green Revolution.' The much-propagated 'New Green Revolution for Africa' continues with techniques that are out of reach for the majority of African farmers. It is also being increasingly recognized that introduction of organic farming leads to increases in both indigenous knowledge and social cohesion. The growing worldwide environmental movement and the well-organised global movement for organic agriculture under IFOAM greatly help in raising awareness amongst African farmers and agricultural professionals alike.

On the African continent, more than 200,000 hectares are managed under certified organic agricultural standards, and South Africa alone manages 45,000-50,000 hectares of such organic farms. South Africa has 250 organic farms with 0.05 percent of agricultural area farmed organically[1]. South Africa has a well-developed organic sector, because it has a substantial domestic market for organic food. Eight different certification organisations for 'bio' are active in South Africa. Two of them (Biodynamic and the Organic Certification Authority) started operating in 2001 and are purely local. Evidence shows that organic small-scale agriculture in South Africa and beyond can deliver increased yields, improved soil fertility and increase incomes for farmers without the environmental and social damage that has resulted from the industrial model of agriculture.[2]

Food insecurity and hunger are realities in the developing countries of the world, and South African rural areas in particular.[3] A combination of increasing population, decreasing rainfall and soil fertility and a surge in food prices has left Africa and other developing countries vulnerable to food insecurity. It is expected that climate change will worsen the situation by increasing the frequency of droughts and floods. Conventional wisdom among governments of developing countries is that modern, mechanised agricultural methods can close the gap, but efforts in this direction have had little impact on food insecurity. The current global food crisis has also led to renewed calls for a massive modernisation of agriculture with calls to push ahead with genetically modified crops.

In South Africa and other developing countries, evidence from research shows that agricultural yields in organic systems do not fall, and at least remain stable when converting from systems that use relatively low amounts of synthetic inputs. Over time, yields increase as capital assets in systems improve. A research project found that organic conversion in tropical Africa is associated with yield increases rather than yield reductions[4].

Organic agriculture leads to improvements in social capital, including more and stronger social organisations or networks at the local level, new rules and norms for managing collective natural resources and better associations with external policy institutions. Strong networks and linkages with groups such as, the Kenya Organic Network (KOAN), the Natural Organic Agricultural Movement of Uganda (NOGAMU), the Tanzania Organic Agriculture Movement TOAM), and the Export Promotion of Organic Products from Africa (EPOPA) help farmers in organising for organic certification, accessing export and domestic organic markets, and in gaining greater knowledge of sustainable organic techniques, crops and markets. In South Africa, as in other developing parts of the world, small-scale farmers engaged in sustainable agriculture rely on each other's farming knowledge and experiences (human capital), as well as support in times of stress and shocks (e.g. vagaries of climate, conflict and crime). This human capital is acquired through social capital.

Organic niche markets are growing rapidly, in which small farmers can obtain higher revenue than typically gained from conventional or GMO agricultural markets. The current commercial boom in organic agriculture demands a 'new African farmer' requiring a supportive environment that includes technical, market and financial assistance to ensure economic benefits from new consumer trends.

Finally, organic farming production methods support environmental sustainability through biological pest management and composting, while discouraging use of GMOs and synthetic chemicals in crop production.

As is the case with other developing parts of the world, there are challenges for African countries, in seizing the opportunities presented by organic production, particularly in building productive capacities and accessing markets, as organic and other forms of sustainable agricultural practises receive little support from African governments. In this respect, four recommendations are drawn from the experience of organic agriculture's potential to contribute to food security and (rural) livelihoods in general, from the South African Republic:

- Firstly, advocacy and training by civil society should be encouraged to bring about change, by encouraging governments to invest in human resource development and skills training in organic agriculture.
- Secondly, information and assessment are crucial in catering to the needs of the poor and vulnerable groups. Understanding the reasons for their vulnerability and food insecurity can help in putting in place compensatory measures, including support to small holder's productive investments, access to land and water resources and provision of agro-ecological knowledge.
- Thirdly, it is crucial to promote an integrated approach to farming where human beings (human labour/capital), environment and other organisms are in harmony
- Finally, more attention should also be accorded to promotion of non-farm activities, particularly those linked to the ecological agricultural sector.

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# 3.4 Status of Agriculture, Food Security and Impact of GMOs -A Country Report for Tanzania

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## Introduction

This article documents the situation of agriculture in the country including status of smallholder agriculture, impact of green revolution on Tanzania's agriculture and food security, status of bio-safety legislation and the impact of GMOs. It also points to some positive examples of sustainable small-scale organic agriculture and food sovereignty.

## Agriculture in Tanzania

Tanzania depends heavily on agriculture both for its food security and the economy. Agriculture and the agri-business industry provide a livelihood for about 80% of the population - mainly in the rural areas. The sector contributes up to 46% of the GDP and generates about 55% of foreign exchange earnings (URT, 2004). Between 2001 and 2003, the sector's annual growth rate was 4.8%, increasing to 6% in 2004. This makes agriculture one of the priority sectors in the country's poverty reduction efforts.

Although agriculture is the main occupation, productivity in the sector is still very low. And since most Tanzanians are engaged in rain-fed subsistence production, it is no wonder then that about 50% of the people are poor, with roughly one-third living in abject poverty.

The Tanzania Development Vision 2025 underscores the role of agriculture in achieving poverty reduction and meeting development targets. The vision of the agricultural sector emphasizes commercializing smallholder agriculture.

It is widely argued that agricultural productivity in Tanzania could be increased significantly by diversifying and increasing production and productivity of smallholder agriculture. Currently, yields of any given crop are only about 20-40% of the potential.

## Status of Smallholder Farming in Tanzania

Small-scale subsistence farming forms the mainstay of Tanzania's agriculture. Smallholder farmers constitute about 90% of the total farming area and contribute approximately 80% of the value of marketed surplus, and 75% of export earnings (URT, 2006; FAO, 2003). They produce about 95% of the drought-resistant staples (sorghum and millet), 85% of the maize and 50% of the rice produced in the country. They thus provide the largest source of food and nutrients for the majority of the population.

Smallholder agriculture is dominated by more than 4 million farm households, cultivating between 0.5-3 ha of land, and by traditional agro-pastoralists who, on an average, keep 50 units of cattle per household. They depend on family labour for their farming and livestock keeping activities, and use relatively labour-intensive techniques of production with minimal mechanization. Production of food for the family is given importance in the allocation of land and labour. The dominance of smallholder production in Tanzania's agriculture means that this category is too important to be ignored in any political and socio-economic development considerations.

About 70% of the crop area is cultivated by hand hoe, 20% by oxen and 10% by tractor. In Tanzania, it is estimated that the ratio of Males to Females in the agricultural sector, in rural areas, is 1:1.5. Over 90% of all rural women and 78% of rural men, are employed in agriculture. Women bear substantial responsibilities in the rural areas and produce about 70% of food crops, although their access to productive resources is limited. They earn 70-80% of all subsistence farming output - being responsible for nearly 60% of all harvesting, 70% of weeding and 90% of processing activities. On the contrary, men's labour exceeds that of women, only in turning the soil and clearing the fields, although with some exceptions.

Following changes in the marketing system during the late 1980s, marketing of many crops was liberalized and both public and private traders could purchase crops directly in the villages. The abolition of marketing boards and the collapse of co-operatives and primary societies, which used to buy and store crops produced by villagers meant that small farmers were left adrift. They commonly market their produce individually, selling it to middlemen at the farm gate, or at the nearest market. In both cases the prices offered are inordinately low, and vary from place to place according to the season. In addition, transport is very expensive and the roads in a bad shape, especially during the rainy season.

## Green Revolution and Impact on Smallholder Agriculture

Like many other developing nations, Tanzania, embraced Green Revolution agricultural techniques from the 1970s as a solution for eradicating hunger and poverty. The emphasis by Government extension and research systems was on promoting modern high-input type of farming. The concentration of research and extension services was on promoting hybrids for better adaptability and improved crop yields. Farmers were lured into believing that high external-input agriculture is the solution to food insecurity and poverty. Many medium and large farmers were able to maximize production by following the advice provided by extension experts, using a package of external inputs. Even smallholder farmers could realize dramatic increases in farm production, since many could afford to buy the highly subsidized external inputs.

However, following the Structural Adjustment Programmes (SAPs) and free-market reforms, extension and related development services were unable to reach the small farmers in rural areas. Removal of subsidies for agricultural inputs forced smallholder farmers to revert to extensive shifting cultivation, as they could not afford high prices of inputs. This resulted in many negative environmental consequences and food insecurity, leaving farmers at the cross-roads. For example, in the Southern Highland Regions (Mbeya, Iringa, Ruvuma and Rukwa), chemical fertilizers brought disaster to peasant farmers. The area, constituting approximately one-fifth of Tanzania's total land area used to be called the nation's 'grain-basket' due to its well distributed, and reliable rainfall, and fertile soils.

Recent evidence shows that in many places arable soils have been acidified, degraded and rendered infertile. Surveys indicate that currently less than 20% of the rural farm households have access to inputs and technology, which would improve the current production systems (URT, 2003). Removal of subsidies also led to lower application rates. For example, mechanized farming is now being practiced by less that 10% of the farmers. Authorities in the fertile southern regions admit that such high use of chemical fertilizers has done great harm to the once fertile soils, which today, are no longer productive.

The Green Revolution failed to live up to its promise of solving problems of smallholder farmers because the technologies were often expensive for small farmers, and proved to be socially and economically inappropriate, with negative ecological effects. Most of the new varieties were easily susceptible to pests, diseases and drought, and subjected farmers to debt, and as a result, many were pushed out of agriculture, or forced to resort to the old ways of farming. Failure to offer appropriate solutions based on specific local conditions and neglect of the complexity of farming systems, resulted in diminishing crop diversity and unsustainable farming systems.

The answer lies in ecological agriculture and organic farming. Smallholder farming must be supported if we are to achieve food security and stop the spiral of impoverishment and starvation that condemns rural people. Access to sufficient food in a sustainable manner, is a fundamental human right.

## Status of Food Security

Availability, as well as accessibility to food is seriously affected. During favourable years, food insecurity is mainly attributed to poor distribution of the available food. For example, in 2002 Tanzania exported 15,291 tons of maize, 38,222 tons of beans, 3,354 tons of rice, and 29,287 tons of wheat *(National Food Security Policy - 2003)*. However, over time, the country has been unable to meet demands, forcing it to resort to food imports to the tune of 4-7% of the total requirement, and food aid to meet production shortfall.

About 40% of the population lives in food deficit areas, and about 25% of Tanzanians are chronically malnourished. In periods of food shortages food prices tend to soar making it unaffordable to most rural households.

During periods of food insecurity, the country has adopted various strategies including banning exports of food crops and redistribution to the most affected areas, and drawing food relief supplies from the national strategic grain reserves. Another strategy has been food aid in the form of major cereals, mainly wheat, rice and maize.

In Tanzania, the main pillar to food security and sovereignty is support and protection of smallholder farming. Currently, farmers are adopting alternative 'organic' fertilizers such as green manure, compost manure or cow dung. Available reports suggest that over 40% of smallholders in Tanzania are using organic materials for soil improvement *(Daily News, 2001)*. Estimates indicate that Tanzania is able to produce approximately 11 million tones of manure from the over 20 million heads of livestock. Experts say that the amount of livestock manure available is equivalent to 77,000 tons of nitrogen a year, which is more than three times the amount of nitrogen used in the country in 1980 - about 22,041 tons. The southern highlands alone, with 2.6 million head of cattle, produce 13 million tones of manure, which could yield about 10,500 tons of nitrogen per year.

## Status of Biotechnology and GMOs in Tanzania

Generally speaking, Genetic Engineering is a relatively new technology in East Africa, about which there is little public awareness, and naturally about its risks and benefits- not to speak of the lack of human and physical capacity to deal with it. In Tanzania, the development of biotechnology is still in its infancy. By 2004, application of biotechnology was still limited to using marker-assisted selection. Other applications include new diagnostics and vaccines for livestock diseases, tissue culture and micro-propagation, embryo transfer in cattle, microbial inoculation of plants in the production of bio-fertilizers, fermentation technology for beverage and energy production and treatment of industrial by-products and agro-industrial wastewater.

However, recent evidence indicates that the East African Governments are increasingly inclined to embrace the technology. For example, it is reported (Kingamkono and Nyange, 2004) that in Tanzania there is one introduction of transgenic tobacco variety with low nicotine content from USA. The variety contains genes of an insect that prevents the gene expression needed to produce an enzyme that produces nicotine. Although the variety lasted for only 3 months after failure in experimental field trials (not commercial production), there is still a risk in introducing such materials without proper frameworks to safeguard safe handling and use.

In 2005, Tanzania allegedly joined six other African countries in conducting in-depth scientific research that would eventually open its doors to GE products. It was poised to start GMO's confined field trials in Southern regions of Mbeya, Rukwa and Iringa where cotton farming was stopped in 1968 in a government move aimed at halting the spread of red bollworm disease that had affected cotton yields. Depending on the outcome of the GM cotton, it is alleged that introduction of GM cassava was to follow. Other countries in Africa that have already started GMOs trials are Tunisia, Zimbabwe, Egypt, Burkina Faso, Morocco, Senegal and Kenya. South Africa is the only African country that is already in commercial production of GM crops.

It is now common to come across headlines stressing that Tanzania cannot afford to be left behind in the race for technological advances. For instance, a media article quoted a Government spokesman saying that *'Tanzania cannot afford to be left behind in technologies that increase crop yields, reduce farm costs and increase farm profits.'* Such statements as '*Tanzania jumps on the GM bandwagon,' or 'GM crop gets green light in Tanzania,"* or '*Tanzania ready to accept GMO technology,*' are part of the propaganda made by proponents of genetic engineering.

Gathering from these developments and discussions in mass media, the Government's position would supposedly appear to be in favour of genetic engineering. It is for this reason that from December 2002, the Government embarked on a process of developing the necessary bio-safety frameworks and building the capacity for responsible application of the technology. A policy paper on the legislative framework needed to govern GM production was hastily prepared and was to be tabled before the Parliament in April 2005, for a debate and approval on the country's approach towards GMO technologies.

However, farmer's organizations and civil society organizations in the country campaigned against the Government move, urging postponement of the tabling of the draft policy to give stakeholders time to study and review the document. PELUM Tanzania (a network of Tanzania's CSOs), its member organizations and MVIWATA (a National Network of Farmer's Organizations) joined forces to issue a press statement arguing that the Government move lacked public participation in the drafting of the policy – which is a violation of the Cartagena Protocol Agreement, to which Tanzania is a signatory since 2003. Following this, PELUM Tanzania, in collaboration with the African Centre for Bio-safety (ACB) in South Africa, made a critical analysis of the National Bio-safety Framework and realized significant gaps and/or weaknesses. These findings were disseminated to the relevant Government Ministries as well as the Members of Parliament.

The argument the NGOs put forward is that, although there are no recorded negative effects of GMOs in the country, there was still an urgent need to take all necessary precautionary measures. The fact that scientific research has not proved the safety of GMO technology on people's lives calls for precautionary measures in order to protect the health of Tanzanians. The Government was urged to seek views of stakeholders before tabling the draft policy to the Parliament. These efforts paid off, as the Government postponed the tabling of the bill.

Following these actions, the Tanzanian Government expressed its intention to engage in public debates and discussions with a view to creating awareness and imparting balanced information on biotechnology among the public. At the same time, it banned the import, growing or germinating, and consumption of GM crops until it has in place legislation, policy or regulation to accommodate the practice (*This Day, December 2006)*). Furthermore, any distribution and sale of transgenic crops, seeds or food substances is declared illegal in the country.

## Development of Bio-safety Legislation in Tanzania

All three East African countries (Tanzania, Kenya and Uganda) have ratified the Cartagena Protocol. Knowing that GMOs might already be within their national systems, the three countries are at different stages of establishing the national bio-safety frameworks, including *National Bio-safety Committees (NBCs)* that act as regulatory bodies for bio-safety. At the same time, precautionary measures were agreed to, and recommended by the SADC Summit of 2003, in order to ensure proper handling of imported food grains, and to protect the country's rich biodiversity.

Key amongst legislative initiatives is *Environmental Management Act – 2004*, which provides for the regulation of development, handling and use of GMOs and products there-of. The Act calls for; among other things, establishment of, and making operational the *Environmental Management (Bio-safety) Regulations*.

The process of establishing a *National Bio-safety Framework (NBF*) was co-ordinated by the Vice-President's Office - a Focal Point for Bio-safety in the country. The process started in March 2003 and involved stakeholders workshops and six surveys to ensure public participation. After attempts to table the legislative framework in the Parliament were intercepted by the CSO's movement, the NBF was finally completed in October 2005.

Despite these efforts, analysts contend that the drafted bio-safety guidelines are merely a set of voluntary, non-legally binding bio-safety guidelines. Experts argue that the guidelines are structurally flawed as they place more emphasis on field trials, yet neglect to provide for adequate regulation of commercial releases and imports of GMO food, including food aid, feed and processing. Also, the guidelines do not make explicit reference to the precautionary principle in decision-making.

In February 2006, Tanzania applied for UNEP/GEF funding of a capacity building project '*Supporting the Implementation of the National Bio-safety Framework*,' in order to meet obligations of the Cartagena Protocol on bio-safety, and to make the NBF fully operational, The project aims at strengthening the existing institutional and technical structures needed to meet the obligations of the protocol. However, such initiatives are likely to suffer from undue donor influence as they seem to focus principally on implementation of the bio-safety protocol instead of enforcing an effective regulatory system. There is a risk of misleading the government officials into being satisfied with applying just a minimum of the standards for implementation of the protocol.

In 2006, in another development, the Government earmarked Sokoine University of Agriculture (SUA) for establishing an agricultural biotechnology centre.

The status of bio-safety regulations in other African countries points to similar weaknesses, suggesting that there is undue external influence on what is supposedly a sovereign process. However, it is also acknowledged that lack of adequate technical capacity is a major constraint, making it easy for external interests to influence the process.

Therefore, Tanzania and other African countries should strive to develop local expertise and capacity for bio-safety regulation at national and regional levels. The increasing pressure from civil society movements could help in resisting external influences in the future. In September 2006, Tanzania, Kenya and Uganda took another step towards developing a regional policy on bio-safety and GMOs by harmonizing the national bio-safety frameworks (EAC, 2006).

While such efforts are commendable, African countries are challenged to use opportunities offered by the revival of *African Union Capacity Building Project*, under the *African Model Law on Safety and Biotechnology*, whose provisions are more comprehensive than those required by the *Bio-safety Protocol,* and underscore the importance of Africa as both a centre of origin, and a centre of diversity, of food and other crops. The AU project has the potential to put in place common environmental standards and protective measures based on the precautionary principle and the *African Model Law*. Such unified legislation would also protect African countries from abuse by the powerful biotechnology industry looking for experimental facilities and dumping grounds for its products.

## Possible Impacts of GMOs and Stakeholder's Position

Proponents and opponents have taken opposing views on the possible effects of GMOs. The contentious issues relate to the impact of agro-biotechnology on the environment, health of human and animals (bio-safety), the ownership and control of genetic resources (IPRs), and the livelihoods and socio-economic future of the resource-poor farmers, in both rural and sub-urban areas. While the proponents argue in favour of the potential benefits of bio-technology, opponents of GMOs contend that the technology is not a panacea to the continent's food insecurity. The main argument against the technology, besides the associated risks, is based on the empirical evidence of the negative impact of green revolution on smallholder farmers.

Among the civil societies and farming community in Tanzania, there is a general consensus that introduction of GMOs poses a real threat, especially on the seed security of small-scale farming communities. While there is yet no definite proof that GM food is not safe, the evidence base has grown. It is for this reason that PELUM Tanzania and its member organizations, MVIWATA and other NGOs and civil societies chose to say 'NO' to GMOs to protect health, environment, and smallholder farmers. A statement issued during the 'NO' campaign, concluded that *"In dealing with living organisms that can recombine, mutate and reproduce, we cannot let the history of chemical, nuclear technologies repeat themselves. Humanity must choose between the dangers and opportunities. We have therefore to choose what kind of agriculture, science and technology we want, as we really don't have the luxury of co-existence."*

Drawing lessons from the empirical evidence of the negative impact of Green Revolution on the small scale farmers in Africa, it is argued by many that genetic engineering seems to be leading us into a similar trap while responding to farmers' problems. No solution can be sustainable, if it does not consider the three main pillars of sustainable development- economic, social and environmental.

Efforts by CSOs to counteract introduction of GMOs in Tanzania have aimed mainly at creating awareness through workshops and public advocacy campaigns, leaflets (in both English and Swahili), publications, newspaper articles and fliers. Examples have been given above of efforts by CPT, MVIWATA, ENVIROCARE, PELUM Tanzania, INADES Formation Tanzania, and others. Since the concept of GMOs is still new to the vast majority of Tanzanians, raising awareness is important to enable farmers, consumers, CBOs and policy makers to make informed choices, and to take appropriate actions with regard to the effects and consequences of introducing GMOs in the country.

In tandem with these efforts, it is important for Tanzania to develop capacity for controlling the movement of GMOs and prevent dumping of biotechnology products that have been rejected in their countries of origin. This is supported by the facts that there is a lot of innovative capacity among smallholder farmers, as well as alternative technical solutions from research scientists, which, if well adapted, offers sufficient potential as far as technical solutions are required. Likewise, the Government is challenged to support development of sustainable agriculture, promotion of local innovations and preservation of biodiversity, instead of GMOs.

## Positive Case Studies of Organic Agriculture and Food Security

The growing experience and interest in alternative agricultural technologies has been shared between NGOs, civil societies and farmer organizations. For example, INADES Formation Tanzania has documented in a series of technical notes some positive experiences of innovative farmers in the semi-arid regions of Tanzania who, faced with huge problems that threatened their very survival, had the courage and capacity to experiment and to innovate. At the national level, there are initiatives spearheaded by NGOs to build a global learning and advocacy network on promoting local innovations in ecologically-oriented agriculture and natural resource management (NRM).

In southern highlands, farmers have been using organic fertilizers – manure and compost – alongside inorganic fertilizers in the production of major food and cash crops. In Mbinga district, there are a high proportion of farmers using compost. The '*ngoro*' system of land preparation practiced by the local people '*Wamatengo*' utilizes a substantial amount of grass compost, making it one of the best systems for controlling soil erosion

In Ruvuma region, the Peramiho Organic Centre of the Catholic Diocese has trained and supported farming communities to shift from inorganic to organic agriculture. Some farmers have confirmed that they realized yield increases of more than 100% by shifting to organic agriculture. For example, some farmers in Songea were able to harvest 36 bags per hectare, compared to the 17 bags normally obtained by using industrial fertilizers. The centre has been promoting the use of soybeans, comfrey, fish beans and other nitrogen fixing plants such as sun hemp, and alfa alfa.

Many other NGOs, community organizations, and research institutions have been testing and promoting alternative ecological agricultural methods such as conservation farming and organic agriculture. These include, regional CARITAS organizations (Tabora, Njombe, and Mbeya), BRAC and MFEC rural development programmes under the Anglican Church of Tanzania – Northern Diocese.

Other efforts include strengthening of organic agriculture production in Tanzania. Several institutions have been established for this purpose, mainly by private sector initiatives, including Tanzania Organic Agriculture Movement (TOAM), Tanzania Organic Certification Agency (TANCERT) and Export and Promotion of Organic

Products (EPOPA), although they are more oriented towards commercial-oriented organic farming, mainly for export purposes.

In order to make such experiences effective, there is need to galvanize research and extension services. NGOs and Government systems need to up-scale these positive experiences. The challenge is to put these positive examples into wider practice, so that the successful innovations at the local level can be scaled up to reach many more farmers.

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# Part 4

## Appendix

# Abbreviations

4.1

| | |
|---|---|
| ABRANGE | Associação Brasileira dos Produtores de Grãos Não-Transgênicos (Brazilian Association of Producers of Non-Transgenic Grains) |
| ACB | African Centre for Bio-safety |
| ACP | Africa, Caribbean, Pacific |
| ANVISA | Brazilian Institut for Environmental Policies |
| AS-PTA | Assessoria e Serviços a projetos em Agricultura Alternativa (Consultancy and Services for Projects on Alternative Agriculture) |
| BRRI | Bangladesh Rice Research Institute |
| Bt | Bacillus thuringiensis |
| CAMA | Consumers Association of Malawi |
| CAOPA | Central de Associações da Agropecuária Familiar do Oeste do Paraná |
| CBD | Convention on Biological Diversity |
| CCZ | Consumer Council of Zimbabwe |
| CEC | Commission for Environmental Cooperation of North America |
| CI | Consumers International |
| Cibiogem | Comisión Intersecretarial de Bioseguridad de Organismos Genéticamente Modificados (Mexico's Inter-Ministry Commission on Biosafety of Genetically Modified Organisms) |
| CICR | Central Institute for Cotton Research |
| CIPR | Integrating Intellectual Property Rights and Development Policy |
| CI-ROAF | Consumers´ International Regional Office Africa |
| CNBA | Comité Nacional de Bioseguridad Agrícola (Mexico's official National Committee of Agricultural Biosafety) |
| CNC | Confederación Nacional Campesina (Mexico's National Rural Confederation) |
| COP | Conference of the Parties (to the CBD) |
| CPB | Cartagena Protocol on Biosafety |
| CSO | Civil Society Organisation |
| CTDT | Community Technology Development Trust |
| CTNBio | Comissão Técnica Nacional de Biossegurança (National Technical Commission on Biosafety) |
| DNA | Deoxyribonucleic Acid |

| | |
|---|---|
| ECOWAS | Economic Commission of West Africa |
| EED | Evangelischer Entwicklungsdienst (Church Development Service) |
| EMBRAPA | Empresa Brasileira de Pesquisa Agropecuária (Brazilian Agricultural Research Corporation) |
| EPAs | Economic Partnership Agreements (between the EU and ACP) |
| EPOPA | Export Promotion of Organic Products from Africa |
| FAO | Food and Agricultural Organisation of the UN |
| FOEI | Friends of the Earth International |
| FSE | Farm Scale Evaluations of spring-sown genetically modified crops |
| FTA | Free Trade Agreement between Central America, Dominican Republic and the United States |
| GATT | General Agreement on Tariffs and Trade |
| GDP or GNP | Gross Domestic or Gross National Product |
| GE | Genetic Engineering |
| GEA | Grupo de Estudios Ambientales |
| GEF | Global Environmental Fund |
| GM | Genetically Modified |
| GMOs | Genetically Modified Organisms |
| GR | Green Revolution |
| HYVs | High Yielding Varieties |
| IAASTD | International Assessment on Agricultural Knowledge, Science and Technology for Development |
| IBAMA | Brazilian Institut for the Natural Enviroment |
| IFAD | International Fund for Agriculture Development |
| IFOAM | International Federation of Organic Agricultural Movements |
| IIRD | Institute for Integrated Rural Development |
| INADES | A Pan-African Non-Governmental Organisation |
| IPCC | International Panel for Climate Change |
| IPR | Intellectual Property Rights |
| IPs | Indigenous People |
| IPM | Integrated Pest Management |
| IRRI | International Rice Research Institute |
| ISP | Independent Science Panel |
| JAP | Joint Advocacy Project of the EED |
| KOAN | Kenya Organic Network |
| LBOGM | Law on Biosafety of Genetically Modified Organisms |
| LMOs | Living Modified Organisms |
| MOFF | Maharashtra Organic Farmers Federation |

| | |
|---|---|
| MOP | Meeting of the Parties (to the Cartagena Protocol) |
| MVIWATA | The National Tanzanian Network of Farmer's Organisations |
| NAFTA | North American Free Trade Agreement |
| NBCs | National Bio-safety Committees |
| NBF | National Bio-safety Framework |
| NGO | Non Governmental Organisation |
| NOGAMU | Natural Organic Agricultural Movement of Uganda |
| NRM | Natural Resource Management |
| OPV | Open Pollinated Variety |
| PACSA | Pietermaritzburg Agency for Christian Social Awareness |
| PCR | Polymerase Chain Reaction |
| PELUM | Participatory Ecological Land Use Management |
| PGS | Participatory Guarantee System |
| PPE | Planeación Parcelaria Ecológica (Ecological Plot Planning) |
| Profepa | Procuraduría Federal de Protección del Ambiente (Federal Attorney's Office for Environmental Protection) |
| SADC | South African Development Community |
| SAFeAGE | South African Freeze Alliance on Genetic Engineering |
| SAPs | Structural Adjustment Programmes |
| SAS | Sustainable Agro-Food System |
| SEIA | Socio-economic impact assessment |
| SEVA | Society for Education in Values and Action |
| SIBAT | Sibol ng Agham at Teknolohiya (Wellspring of Science and Technology) |
| TANCERT | Tanzania Organic Certification Agency |
| TOAM | Tanzania Organic Agriculture Movement |
| TRB | Research Bureau of Tobacco in Zimbambwe |
| UBINIG | Policy Research for Development Alternative |
| UCS | Union of Concerned Scientist |
| URDC | Universal Declaration of Human Rights |
| UNEP | United Nations Environmental Programme |
| USDA | US Department of Agriculture |
| VAD | Vitamin A Deficiency |
| VOFA | Vidarbha Organic Farmers Association |
| WFP | World Food Programme |
| WHO | World Health Organisation |
| WTO | World Trade Organisation |
| ZACA | Zambia Consumers Association |

# 4.2 The Authors

| | |
|---|---|
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# 4.3 The Bonn Declaration

## By Rural Development Organisations from Africa, Asia and Latin America

### *GMOs: A Threat to Food Sovereignty*

We the representatives of civil society organisations, NGOs and independent or pro-people scientists from Africa, Asia, Europe and Latin America, meeting in Bonn, Germany, from November 4-5, 2004 with a view to discuss the effects of Genetic Engineering (GE) on our Food Sovereignty and to develop strategies for safeguarding the same, have reached the following conclusions and demands:

- **We affirm with** pride the mega diversity and the organic integrity that symbolises the rich and unbroken tradition of our agriculture, its vital interrelationship with our livelihoods and culture, the knowledge of the farming community especially that of women and indigenous peoples on which it is founded. We oppose genetic engineering (GE) which undermines all these values and the worldview that has nurtured these values.
- **We recognise** with great concern that GE as the latest manifestation of global industrial agriculture, displaces sustainable small-scale agricultural systems, destroys biodiversity, impacts human health negatively, appropriates our seed sources and people's knowledge through IPR (intellectual property rights) processes. We oppose patents of life forms. This predatory nature of GE erodes the food sovereignty of our peoples and thereby undermines our national sovereignty. It is a threat to food sovereignty.
- **We dismiss** the notion that GE can contribute to combating hunger. Hunger is a political problem. We underline that we support the agricultural systems of our farmers that have the capacity to feed the people.
- **We discard** the notion that GE can coexist with other forms of agriculture because the contamination it creates is uncontrollable, inevitable and irreversible with a devastating impact on our environmental, social, economic and cultural existence.
- **We are convinced** that under the oppressive conditions of globalisation, our governments are co-opted by the global capital, transnational corporations and

trade agreements to allow the entry of GE into our countries. Therefore we strongly believe in the need to lobby our parliaments, governments and policy makers, engage in advocacy at local, national, regional and international level by forming rainbow alliances with farmers, fishers, indigenous peoples, women's organisations, independent or pro-people scientists, consumers, industrial and non industrial workers and churches in order to creatively campaign on these issues, in order to stop and prevent GE entering agricultural and food systems and to protect and preserve biodiversity and original knowledge.

- **We demand** that all dumping practices of food have to stop, especially if they also go along with GM trans-boundary movement, including food aid, cheap food supply and other marketing promotion mechanisms.

**The Members of the Joint Advocacy Project of the EED**

# 4.4 Contamination Register by Greenpeace and GeneWatch UK

**http://www.gmcontaminationregister.org/index.php?content=nw_detail1**

GM Contamination Register Report 2007, by GeneWatch UK and Greenpeace International exposes 39 new instances of crop contamination in 23 countries over the past year. Most of the contamination involved such staple crops as rice and maize, but also included soy, cotton, canola, papaya and fish. Over the past 10 years, the annual Register Report has recorded 216 contamination events in 57 countries.

The 2007 incidents of contamination and illegal release involved cotton (one), fish (four), maize (nine), oilseed rape (two), papaya (one), rice (twenty) and soybean (two). A big change in the data for 2007 shows that 25% of incidents over the past ten years have been in rice, despite the fact there is no commercial cultivation of GM rice anywhere in the world. These cases have been caused by three varieties of herbicide tolerant rice developed by Bayer Crop Science – LLRICE62, LLRICE601 and LLRICE604 – and Bt63 rice from China. None of these illegal releases initially came to light in 2007; Bt63 was first discovered in 2005 and Bayer's LLRICE varieties in 2006. Yet they continue to cause major problems for a rice industry which has rejected genetic modification.

**GeneWatch UK and Greenpeace again consider that these findings require that governments:**

- Require event-specific detection methods for GMOs as a prerequisite for field trials in addition to commercialisation. The detection methods and associated reference materials should be made publicly available to facilitate identification in case of GMO escape.
- Urgently enforce international standards for the identification and documentation of transboundary shipments of GMOs.
- Ensure that the public interest outweighs commercial confidentiality issues.
- Target imports of food, feed and seed from high-risk, GM-growing countries for routine tests for GM contamination and subsequent investigation.

- Deny to companies their right to commercialise GM products if the companies are involved in intentional illegal releases of GMOs or fail to cooperate in their prevention and management.
- Act firmly against violators when an illegal act takes place. Without substantial and predictable sanctions, sloppy practice and complacency are likely to be encouraged.
- Oblige companies to keep records of the global dissemination of their products and GMO events, and make these publicly available, as a matter of product stewardship. Stop all approvals and releases of GM organisms under present conditions.

# 4.5 List of Members of the Joint Advocacy Project of EED and its Partners

## Africa

Christian Care, Zimbabwe

Participatory Ecological Land Use Management (Pelum), Tanzania

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Evangelischer
Entwicklungsdienst