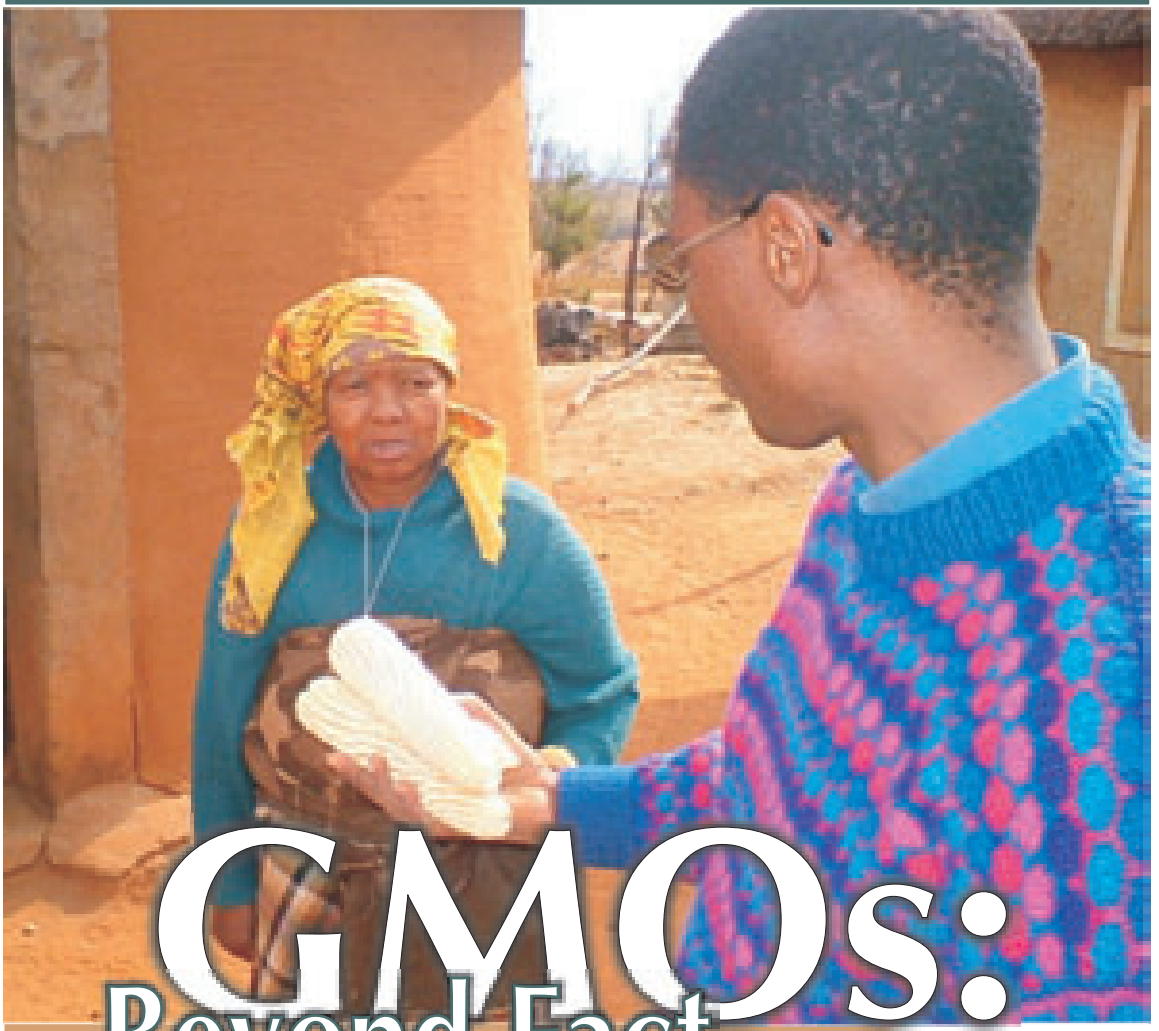
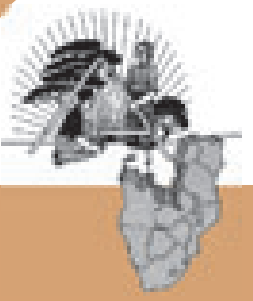
PELUM policy briefing papers on agricultural financing, agro technology and trade series No. 1, 2005
Genetically Modified Organisms (GMOs)



GMOs: Beyond Fact & Fiction



A challenging dilemma to food security and food sovereignty in east, central and southern Africa

A Policy Briefing Paper for civil society organisations, smallholder farmers, development workers; and policy-makers in east, central and southern Africa.

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Acknowledgements

Smallholder farmers are at the heart of PELUM's work. PELUM seeks to help farmers produce more food sustainably, generate income from their natural resources and agricultural produce. PELUM has been supporting East and Southern Africa Small Scale Farmers' Forum (ESAFF) to be able to influence the policies and practices around them so that they work for, not against smallholder farmers.

When the GMO threat loomed in east and southern Africa, PELUM Association shared information about it with the members, farmer leaders and groups and policy markers. The first such effort was in 1998 when Pat Mooney, one of the world's best on the subject, was invited to take part in a one day debate with seed companies in Zimbabwe. This created a lot of awareness.

During the World Summit on Sustainable Development in 2002, in South Africa, PELUM mobilised some 160 farmer leaders and development workers to attend the Small Farmer Convergence alongside the WSSD. When PELUM was asked to host the Commission on Agriculture during the Summit, the issue of GMOs arose and PELUM took a bold "NO" position, and distributed posters to that effect, with support from such individuals as activist Vandana Shiva who was present at the Convergence.

PELUM has organised and attended a number of workshops on GMOs. Beyond that, PELUM developed and shared some fact sheets on the subject during its 2003 Biennial General Meeting. At this meeting, the members decided that PELUM should develop and publicise its stand on GMOs. This was done in 2004 as the advocacy officer, Joe Mzinga and Zachary Makanya, took on the challenge and produced the stand based on member inputs.

This policy brief is yet another attempt at articulating some of the main issues and possibilities that exist around the subject of GMOs. I am pleased that we have been able to have this compiled. The idea has been to not only criticize GMOs but to provide sustainable options.

For this particular brief, I wish to sincerely thank all PELUM Board members: Mary Jo Kakinda, Jonathan Chisaka, Me Mampho Thulo, Eliud Ngunjiri, Djax Biria, Thembekile Kanise, Rob Sacco, John Bideri, Russell Clark and the late Yves Marches for their support and directives. We also thank the Country Desk Coordinators: Zachary Makanya (PELUM Kenya), Emily Drani (PELUM Uganda), Moshe Tsehlo (PELUM Lesotho), Yakobo Tibamanya and Donati Senzia (PELUM Tanzania), the Late Keerate Moreri (PELUM Botswana), and Maimbolwa Shula, Aselly Mwanza and Tim Cornel (PELUM Zambia) for their ideas and encouragements towards the production of the position paper and eventually this publication. Also a note of gratitude to PELUM Regional Desk staff: Mary Kabelele, Eneya Maseko, Freda Chirwa, James Mumbi, Russell Phirri and Adelia Malenga for their contributions and support.

Last but not least, this Policy Brief could not have seen the light of day except for the tireless efforts by Joe Mzinga in compilation and writing the manuscript and the involvement in copy editing and tidying up by Mariam Mayet of the African Centre for Biosafety, South Africa.

Mutizwa Mukute
Secretary General
PELUM Association

"The assumption that we need to create new crop varieties through the use of genetic engineering technologies overlooks the fact that there is untapped potential within the wealth of existing varieties. In Africa, for instance, more than two thousand native grains, roots, fruits and other food plants are found. These have been feeding people for thousands of years, but most are receiving no scientific attention today."[1]
- Southern African Catholics Bishops Conference, November 2000.

Introduction

Biotechnology has been used in agriculture for eons. Our ancestors practiced fermentation to preserve food and brew beer. However, recent developments in science and technology have expanded the scope of biotechnology to include a new and not fully tested technology, namely, Genetic Engineering (GE).

Genetic Engineering has made a rapid entry into agriculture through the introduction of Genetically Modified Organisms (GMOs) such as genetically engineered maize, cotton, soya and canola. Due to the growing influence of a handful of transnational agro-food companies, food is now produced, processed and marketed using GE techniques and inputs which are owned or controlled by a handful of transnational agro-food companies. Worldwide, the top ten seed firms now control 30% of the multi billion-dollar global seed market and the top three are large multinational GE companies, namely, Dupont (USA), Monsanto (USA) and Syngenta (Switzerland).[2]

In Africa, GE crops are so far only commercially available in South Africa and Egypt. South Africa has played a key role in facilitating the introduction of GMOs into Africa through research and development, legislation permitting the planting and export of GE seeds and products. Already there have been open- air field trials of GMOs in Kenya, Burkina Faso, Tanzania, Senegal, Mali, Angola, Mauritania and Zimbabwe. These have taken place in the absence of biosafety laws and without the knowledge of the public.

Those who are in favour of GE claim that by transferring genes from one organism to another, "improved" GE crop plants can overcome the constraints of conventional agriculture such as the use of pesticides, tilling, weeding and low production. In this way, they argue, food security in developing countries will be achieved and hunger will be eradicated. Strong supporters of GMOs include the United States Department of Agriculture (USDA), which claims that GE "is the response to the needs of millions of people who don't have enough food."[3]

However, GMOs impact on several fundamental human rights derived from the Universal Declaration of Human Rights. Amongst these are the rights to nutritious, safe and culturally acceptable food, the right to informed choice, the right to democratic participation, the right to save and exchange seeds, the right to a safe and healthy environment and ethical objections.

On a high political level, Africa has been deeply embroiled in the GE debate. However, the public and farmers are still kept in the dark about GMOs and the risks that GMOs pose to human health, biodiversity and society. Additionally, public sector groups involved in agriculture

"GMOs can mean the loss of peasant autonomy and greater dependency on the transnational corporations, both technologicall y and economically. " - Via Campesina, 25 April 2001.

education have limited access to reliable information, thereby making them vulnerable to a biased and one-sided view that favours the introduction of GMOs in Africa.

This Policy Briefing Paper is aimed at providing information to farmers, extension workers, ordinary citizens and policy makers in east, central and southern Africa about the risks posed by GMOs. In this regard, this briefing provides cogent arguments why the region should stress a precautionary approach to GMOs. The risks posed by GMOs are numerous and multi-faceted. However, the most ominous risk of all is the loss of power by farmers to control vital components of their means of production and the production chain. Corporate concentration of power to control the food chain is an ever increasing threat. If this trend is not arrested, including rejecting unsuitable GE technology; the GE industry will eventually control agriculture from seeds to supermarkets. A few gene companies will determine what we farm and what we eat. The big question is; what will then happen to the poor of the world?

Defining Biotechnology, Genetic Engineering and Genetic Modified Organisms (GMOs).

1.1 What is Biotechnology?

The use of biotechnology in agriculture is not new for Africa. For many years, African countries have been using tissue culture techniques to increase food productivity. Tissue culture involves the use of techniques that stimulate the growth of small components of animal or plant tissue in a sterile controlled medium. It mainly involves micro-propagation and disease elimination in crops, including food crops like potatoes, cassava, and mushroom. It is also used in the production of horticulture crops.

Other technologies within the biotechnology regime include fermentation and artificial insemination. The fermentation technology is widely used in the region for brewing beer. Artificial insemination and embryo transfer technology, on the other hand is widely used in livestock research, breeding and conservation.[4]

The scope of these forms of "old" biotechnologies has been expanded to include "modern biotechnology", which is a term used inter-changeably with genetic engineering.

1.2 What is Genetic Engineering?

Genetic engineering (GE) is a set of laboratory techniques used for isolating genetic material from organisms and then cutting and rejoining these to make new combinations, multiplying copies of the recombined genetic material (also called recombinant DNA) and transferring it into organisms.

1.3 What is Genetically Modified Organisms (GMOs)?

Genetically modified organisms are new plants, micro-organisms or animals created through Genetic engineering that involves the artificial production of different varieties of crops, microorganisms and animals by the introduction of strains of genetic material from a completely different and unrelated species or organisms, into plants, micro-organisms or animals. *see an example of adding fish gene to a tomato page 9 section 1.7*

The process involved in creating a GMO bypasses reproduction altogether, so that completely new genes with new functions, as well as new combinations of genes can be introduced, which will interact with the organism's own genes in unpredictable ways.
Whereas traditional breeding involves mixing of thousands of genes, GE allows for the selection of a particular gene (that some scientists believe) is responsible for a particular trait or characteristic, isolating this and inserting it

GE is a new, not fully tested technology that enables the creation of organisms that would never occur in nature through reproduction and conventional breeding methods and, in respect of which, there is no evolutionary history in nature. ***See 1.7 page 9***

into a plant or animal. Genes can also be 'switched' *on* or *off* through GE.

1.4 How are Herbicide Tolerant GM Plants Made?

Herbicide tolerance in a plant is achieved by introducing an herbicide tolerant gene into a host plant such as maize, so that the maize is able to withstand the application of herbicides in the field. Such a GMO is commonly referred to as "*herbicide tolerant*" or Roundup Ready GMO.

Roundup Ready is Monsanto's brand name for the poison/herbicide that the GMOs are meant to tolerate.

Genetic Engineering is characterised by scientific uncertainty. This stems from several factors including the inherent imprecision of currently employed recombinant DNA techniques, the use of powerful promoter sequences in genetic constructs and the generation of novel proteins to which humans and animals have never previously been exposed

1.5 How are Pests Tolerant GM Plants Made?

Through genetic engineering a plant's DNA can be altered so that it's resistant to particular pests to which a particular plant is susceptible. Such a plant is then referred to as a GMO that is "pest resistant" or "insect resistant."

The gene, which is inserted into such a plant to make it pest resistant, comes from a naturally occurring toxin that occurs in the soil, called *bacillus thuriengiensis* (Bt).

1.6 What are the risks posed by Roundup Ready and Bt GM plants?

The risks posed by insect resistant crops (Bt) include insects developing resistance to insecticides and negative impacts on non-target organisms, including soil biota. Insecticide resistance in insects might lead to the appearance of "super insects" that cannot be killed by insecticides.

Roundup Ready crops or herbicide tolerant crops transfer herbicide-tolerant traits to weeds resulting in the creation of "superweeds". Additionally, the use of agrochemical, glyphosate, has already resulted in several unwanted negative effects on aquatic systems and terrestrial organisms and ecosystems.
The US experience of Roundup Ready field trials has shown a marked increase in herbicide usage, particularly glyphosate.[5] In the Argentinean experience, the large- scale uptake of Roundup Ready soya has had devastating impacts on food security and the environment.[6]

Currently, the United States, Argentina, Canada, China, Brazil and South Africa are responsible for 99% of the GE crops grown globally, estimated to be 67.7 million hectares during 2003.[7] These countries commercially grow GE cotton, maize, canola and soybean with transgenic resistance to herbicides, insects or diseases.

1.7 How Can Genetic Engineering Add a Fish Gene to a Tomato?

Scientists have created a frost-resistant tomato plant by adding to it an antifreeze gene from a cold-water fish. The antifreeze gene comes from the cold-water flounder, a fish that can survive in very cold conditions. This is how it was done.

(1.) The flounder has a gene to make an antifreeze chemical. This is

(2.) The antifreeze DNA is joined onto a piece of DNA called a plasmid. This hybrid DNA, which is a combination of DNA from 2 different sources, is known as recombinant DNA.

(3.) The recombinant DNA, including the antifreeze gene, is placed in a

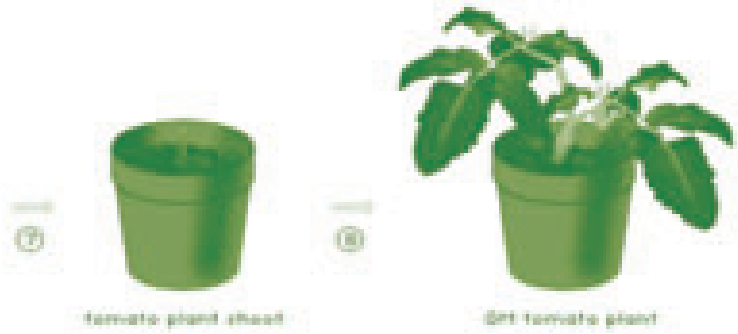
(4.) The bacterium is allowed to reproduce many times producing lots of copies of the recombinant DNA.

(5.) Tomato plant cells are infected with the bacteria. As a result, the antifreeze gene in the plasmid in the bacteria, becomes integrated into the tomato plant cell DNA.

(6.) Tomato cells are placed in a growth medium that encourages the cells

(7.) Tomato plant seedling is planted.

(8.) This GM tomato plant contains a copy of the flounder antifreeze gene in every one of its cells. The plant is tested to see if the fish gene still works. Is it frost resistant? Yes it is.



Source: http://www.bbc.co.uk/science/genes/gm_genie/gm_science/index.shtml

Box 1.

1.8 Chronology of Genetic Engineering in the Last Decade

- 1993 Monsanto uses GE to make bovine somatotropin protein supplement to increase cows' milk yields. In the same year, the United States Food and Drug Administration (FDA) declares that GE foods do not require 'special regulation'.
- 1994 - The first GE food, FlavrSavr tomato produced by Calgene is approved by the FDA, marking the beginning of widespread use of GMOs in the USA because by the end of 1995, 35 applications to commercially grow GE plants in the US and Canada were granted. Indeed, in 1994, Roundup Read Soya was approved in the US for commercial planting.
- 1996 - Roundup Ready Soya and insect resistant maize (also known as Bt maize) were introduced in the US.
- 1997 - South Africa becomes the first country in Africa to authorise the commercial planting of a GE crop. It authorises the commercial growing and selling of Bt maize seeds. The same year, South Africa authorises the commercial planting of Bt cotton. The European Commission's Novel Foods regulation comes into effect, which requires a safety assessment for novel and GE foods before they are permitted to go on sale.
- 1998 -The first GE labelling rules are introduced, and the commencement of growing of Bt maize by South African smallholder farmers.
- 2000 - The Cartagena Protocol on Biosafety is adopted in February 2000, in Montreal, Canada.[8]
- 2000 The Starlink contamination scandal in North America causes hundred of maize products to be recalled because of contamination by GE maize not approved for human use.

- 2001- At its 74th Ordinary Session convened in Lusaka, Zambia in July 2001, the former OAU, (now the African Union) Council of Ministers endorses the African Model Law on Safety in Biotechnology (African Model Law). The Council furthermore urges its member states to use the African Model Law to draft their own national legal instruments in order to create a systematic and Africa-wide biosafety regime to regulate the movement, transport, and import into Africa of GMOs.[9] The same year, the presence of transgenes in traditional races of maize in Mexico is revealed. The contamination is thought to have originated in maize exports from the US. In the same year, the draft sequence of the Human Genome is published with far fewer genes than expected. This radically alters the understanding of how genes must function-a paradigm shift. The Central Dogma is now viewed as over-simplified-genes are subject to a control network. The same year, South Africa authorizes the commercial planting of GE Soya.
- 2002-The Prodigene Pharm (US) crop scandal breaks. Soybeans worth millions of dollars are destroyed in the US feared to be contaminated with GE maize field-tested to produce drugs.
- 2002- On the 11 September 2002, the same year, the United Nation's Cartagena Protocol on Biosafety comes into effect when Palau becomes the 50th country to ratify the Protocol.
- 2002-2003 - Zambia imposes a ban on GE food aid being imported from the US by the World Food Programme. Several other countries in Southern Africa request that GE food aid first be milled before being distributed in their countries.
- 2004- During 12-16 January 2004, an African expert committee convened under the auspices of the African Union's Scientific, Technical and Research Commission recommends that member states of the African Union impose a moratorium on GMOs. In this same year, Sudan and Angola impose restrictions on GE food aid.
- 2004 - In December, the Kenya Small Scale Farmers Forum (KESSFF) in partnership with PELUM Kenya expresses concerns about the Kenyan draft Biosafety Bill. According to KESSFF, the draft Bill barely acknowledged the potential risks of GE crops and provides scant opportunity for farmers or the public to object to GE plantings, or for farmers whose livelihoods are ruined by GE contamination to claim compensation for their losses.
- 2005 On the 27 January 2005, Angola's Council of Ministers passed a decree banning the introduction of any variety of GE seeds and grains into Angola. In the same month, Tanzania announces that it is drafting legislation to pave the way for the introduction and use of GMOs.

2. Overview of Status of GMOs in East, Central and Southern Africa

2.1 Africa at a Glance

The hungry Gene multinational companies have not spared Africa. This is a part of the overall global strategy and campaign to dominate the food chain from seeds to supermarkets. By domination and successful introduction of GMOs in Africa, the US-led campaign assumes they will eventually weaken the European resistance to GMOs.

- To date, only two (2) countries have authorised the commercial plantings of GMOs. These are Egypt and South Africa.
- Nine (9) countries have reported field trials of GMOs: Burkina Faso; Egypt; Kenya; Morocco; Senegal; South Africa; Tanzania; Zambia; and Zimbabwe.
- Twenty (20) countries are engaged in GMO research and development. These are Benin; Burkina Faso; Cameroon; Egypt; Ghana; Kenya; Malawi; Mali; Mauritius; Morocco; Namibia; Niger; Nigeria; Senegal; South Africa; Tanzania; Tunisia; Uganda; Zambia; and Zimbabwe.
- At least twenty four (24) countries have the capacity and institutions to conduct research and development into agricultural biotechnology: Algeria; Benin; Botswana; Burkina Faso; Cameroon; Egypt; Ethiopia; Ghana; Kenya; Madagascar; Malawi; Mali; Mauritius; Morocco; Namibia; Niger; Nigeria; Senegal; South Africa; Tanzania; Tunisia; Uganda; Zambia; Zimbabwe.
- Twenty seven (27) African countries have ratified the Cartagena Protocol on Biosafety to date.[10]

2.2 South Africa: The Gateway for GMOs into Africa

In 2004, 500,000 hectares of GE crops were planted in South Africa. This includes 400,000 hectares of GE maize (15% of total hectares of maize planted in South Africa); of which 155,000 hectares was GM Bt white maize for human consumption. In addition, 70,000 ha of soybean (50% of total soybean hectares) and 30,000 hectares of cotton (85% of total cotton hectares) were commercially planted in South Africa.[11] Nearly all of the GE crops grown in South Africa are sown on large commercial farms.[12]

South Africa has played a pivotal role in facilitating the introduction of GMOs into Africa and furthering the interests of the GE industry. It has done this through research and development, legislation permitting the planting, import and export of GE seeds and products, and the export of its GE thrust into Africa using especially the Makhathini Flats as a model.

"We say NO to genetically modified foods, we do not need genetically modified seed, ...small scale farmers farm for people and not for industry"

- Press statement by smallholder farmers at the WSSD meeting, 22nd Aug. to 1st Sept. 2002, Johannesburg.

Monsanto (SA) introduced GE cotton to an estimated 3000 smallholder farmers on the Makhathini Flats in KwaZulu-Natal in South Africa, this being the first case in Africa where African smallholders have planted GE cotton commercially. Monsanto and other proponents of GE, including the US government, have showcased the success story of the Makhathini GE cotton farmers on the world stage. However, research shows that the success of the Makhathini farmers has only been possible with high levels of state support and infrastructure that makes for exceptional circumstances, which cannot be replicated in other parts of South Africa or Africa.[13] This support includes the provision of seeds, channelling of credit to farmers, preferential access to water and a guaranteed purchaser for the harvest.[14]

South Africa, once a net exporter of maize, now imports millions of tons of cheap GE maize from Argentina to feed South Africa's livestock and poultry. This imported and locally grown GE maize is co-mingled with locally produced maize, which enters the South African food chain.

Moreover, this contaminated maize from South Africa is exported to countries in Southern African unless these countries require that South African exporters certify shipments of maize, as being "GE free".

South Africa is also fast becoming a nursery for the production of GE seeds because the weather in the Southern hemisphere is more favourable for growing such GE seeds than it is in the Northern hemisphere. GE seeds produced in South Africa during the South African growing season are exported to the US for further propagation and growing during the US growing season.[15]

2.3 Kenya: Following in the Footsteps of South Africa

Kenya is at the forefront of GE research in East Africa. The Kenyan Agricultural Research Institute (KARI) is the leading research institution involved with GE research. KARI receives substantial funding and support from the United States Agency for International Development (USAID), the World Bank, and GE companies such as Monsanto and Syngenta. Recently, an initiative spearheaded by KARI and funded by USAID and Monsanto, to develop a GE virus resistant sweet potato failed dismally after almost 12 years of wasted research and experimentation. This was at a cost of more than $10 million.[16]

In June 2004 the Kenyan government launched a "level II biosafety greenhouse" that allows for containment of GE crops at the experimental stage. KARI and the International Centre for Maize and Wheat Research (CIMMYT), which also trained scientists to manage the facility at its centre in Mexico, jointly developed the greenhouse. It was built as part of the Syngenta Foundation's Insect Resistant Maize For Africa (IRMA) project that aims to develop a maize variety resistant to the stem borer. The greenhouse was funded by the Kenyan government and Switzerland-based Syngenta Foundation.[17] Approval to introduce Bt maize seeds to carry out the specified research in the greenhouse has already been granted by the Kenyan National Biosafety Committee (KNBC). In May 2004 the project was waiting for Kenya Plant Health Inspection Services (KEPHIS) to issue a permit before Kenya's first GE maize

could be grown.[18] KEPHIS placed more stringent regulatory measures on the project, setting the project back by 2 years. This means that the GE maize is not expected to be released for commercial sale until 2010.[19] However, in early 2005 it appeared that KARI and IRMA would be proceeding with field trails, pending approval from the National Biosafety Committee.[20] KARI and CIMMYT are also working on developing GE herbicide resistance in maize to combat the Striga weed.[21]

2.4 Quick Glance at East, Central and Southern Africa

Lesotho, Mozambique, Swaziland, Namibia, Malawi, Zambia and Botswana have limited activities involving GMOs. Mauritius is engaged in research with GE sugar cane, although no experiments have yet taken place in open field trials. Zimbabwe has conducted limited field trials of GE maize and cotton. Alarmingly, Tanzania has already allowed the growing in open field trials of GE pharmaceutical crops, but this is a closely guarded secret and very little information is forthcoming from the Tanzanian government. But what has been ascertained is that during 2002, tobacco genetically engineered to produce low content nicotine was field tested on 200 hectares in the Kilimanjaro area, Tanzania.[22] Tanzania is a participant in the USAID-funded Association to Strengthen Agricultural Research in East and Central Africa (ASARECA). The Tanzanian government announced in February 2005 that field trials of Bt cotton were being planned to begin before October 2005 in Mbeya, Rukwa and Iringa regions.[23]

Africa's environment and ecosystems have become the experimental grounds for all and sundry involved in GE.

Although Angola introduced a ban on imports of unmilled GE food aid, its council of Ministers passed a decree in January 2005 confirming that GMOs are banned except for the purposes of food aid. In 2004, it was learnt that a Danish company had already field- tested in Angola, a GE plant modified to go red when it detects landmines in the soil. These tests have been conducted without any biosafety measures being in place in Angola and without the prior informed consent being given by the national authorities in Angola in charge of biosafety matters, as is required under international law.[24]

While there are no known R & D, field trials and commercial releases of GMOs taking place in Central Africa, several central African countries including Burundi, Rwanda and the Democratic Republic of Congo (DRC) are participants the ASARECA project. ASARECA facilitates collaborative research between those countries in Africa linked to the ASARECA, US public and private sectors and international agricultural research centres. The principal aim is to foster regional acceptance of GE through weak biosafety regulations.[25] ASARECA is a partner of USAID's Agricultural Biotechnology Support Project (ABSP) whose goal is to support research, product development and policy development for the commercialisation of GE crops. Private partners of ABSP include Monsanto, Syngenta, Pioneer Hi-Bred and DNA Plant Technology.[26]

3. Pressures On Africa To Accept GMOs

There are multiple strategies at play, aimed at introducing GM crops into Africa. These include inter alia the provision of food aid, enhancement of weak policies and laws, investment in biosafety capacity building projects and privatisation of agricultural research and development.

There is also a deliberate and well-orchestrated, multi-pronged strategy aimed at pushing GE (Bt) cotton into Africa in a bid to take control over African cotton production. Africa has become a frontier that the GE companies seem determined to conquer. The short- term aspirations of increasing agricultural productivity may seem appealing for many African policy makers, scientists and farmers. However, the ominous side of GE technology is that it will destroy the livelihoods of millions of small-scale farmers and make them dependent on a few big GE companies. Food as a political weapon in the hands of the few companies is tantamount to the re-colonisation of poor countries.

"Food as a political weapon in the hands of the few companies is tantamount to the re-colonisation of poor countries".

3.1 GE Food aid: Trojan horse for Introduction of GMOs into Africa

Through food aid, the World Food Programme (WFP) and the United States Agency for International development (USAID) exert considerable pressure on African countries facing food deficits to either accept GE food aid or face starvation. This has occurred even when alternative supplies of non-GE food have been available on the local, national and regional level.[27] GE food aid is an effective backdoor strategy for the introduction of GE food into Africa. During the 2002/2003 food crises in Southern Africa, Zimbabwe, Zambia, Malawi and Lesotho were targeted for supplies of GE maize. These countries faced enormous pressure to accept the GE food aid, with the result that only Zambia imposed an outright ban and the other countries bowed to pressure and accepted the GE food aid. In March 2004, Angola and Sudan expressed reservations, but due to political pressure, accepted GE food aid.

GE food aid serves three purposes:

- It acts as a mechanism for the disposal of highly subsidised food surpluses produced in countries like the US;
- It opens up new markets for GE foods in developing countries; and
- It serves as an opportunity for the conducting of a massive human experiment,[28] taking into account that the GE industry has failed, to date, to provide conclusive evidence that GE foods are safe. This has greatly been enabled by the failure by the US Food and Drug Administration to oversee an independent, mandatory safety assessment process to determine the impact of GMOs on human health. It merely oversees a voluntary system under which corporations submit their own safety procedures for their products.[29]

3.2 Take over of Agricultural Research and Development: East and Central Africa

As a deliberate strategy to take over agriculture research and development n Africa for the purpose of introducing GE in Africa, the USAID-funded Program for Biosafety Systems (PBS) "assists" countries in East and West Africa to enhance biosafety policy, research, and capacity. The International Service for National Agricultural Research (ISNAR) from the Netherlands is the lead institution. PBS members include the International Food Policy Research Institute (IFPRI, USA), Donald Danforth Plant Science Centre (DDPSC, USA), AGBIOS (Canada), Michigan State University (MSU, USA) and Western Michigan University (WMU, USA). The USAID funder programme (PBS) has partners in East and West Africa. The PBS punters in East Africa are the African Biotechnology Stakeholders Forum (ABSF-Kenya), Association for Strengthening Agricultural Research in East and Central Africa (ASARECA-Uganda) and the East African Regional Programme and Research Network for Biotechnology, Biosafety, and Biotechnology Policy Development (BIO-EARN-Uganda).[30] BIO-EARN is a programme to build policy and research capacity in agricultural biotechnology in Kenya, Uganda, Ethiopia and Tanzania funded by the Swedish Development Agency (SIDA) with policy development funded by IBS/International Service for National Agricultural Research (ISNAR). BIO-EARN's 3-5 year plan is to produce genetically modified cassava, sorghum and sesame with altered starch and oil composition.[31]

"Well-resourced industry lobby groups such as the US based International Service for the Acquisition of Agribiotech Applications (ISAAA), which has an office in Kenya and AfricaBio, based in South Africa, invest enormous resources in promoting GE and industry's propaganda in Africa"

The African Agricultural Technology Foundation (AATF) is a public-private partnership based in Kenya, with the purpose of developing agricultural biotechnology, including GE technology, in Africa. AATF received start-up funds from USAID, the Rockefeller Foundation and the United Kingdom's Department for International Development (DFID), as well as from Monsanto, Dupont, Dow and Syngenta.[32] In 2004 the AATF signed a memorandum of understanding with the USDA to share and disseminate agricultural technologies.[33] Focal areas include development of insect resistant maize, pro-vitamin A enhancement in maize and rice, and cowpea production.[34]

A Biosciences Facility for Eastern and Central Africa is being established as part of NEPAD's (New Partnership for Africa's Development) continent-wide network of centres of excellence. Establishment of the new Facility has been made possible by an initial investment of more than Canadian $30 million by the Canada Fund for Africa through the Canadian International Development Agency.[35]

By taking over research and development programmes, the multinational GE companies and pro-GM countries would change the research agenda in Africa to suit the interests of the rich countries and the GE companies. When this is done, Africa will fail to exploit untapped potential in agriculture.

3.3 Undue Influence in Biosafety Policy and Regulation

A strategy used by proponents of GMOs such as the US, is to "claim" to provide capacity building and funding for the development of biosafety policy and laws in Africa. African countries are extremely vulnerable to abuse, because they lack the technical and financial resources to put biosafety laws and policies in place.

While the US is still not a party to the Biosafety Protocol and has not even ratified the UN's Convention on Biological Diversity (CBD), USAID has made a number of biosafety interventions in Africa, designed to perpetuate weak biosafety regulation and oversight in Africa, based on US style sub-standard biosafety regulation. One such example includes the May 2003 award by USAID to the Programme for Biosafety Systems (PBS) of an amount of $14.8 million.[36] Among other things, the programme's objective is to assist national governments in implement the Biosafety Protocol.

"It is extremely contradictory for the US, which is trying to introduce GE foods in Africa through a backdoor, to claim that it is promoting biosafety in Africa. The real agenda, however, is to make sure that there are weak biosafety regulations in Africa, and thereby pave the way for the introduction of GE technology trials and eventually GM seeds and food".[37]

3.4 Focus on southern Africa:

The Southern Africa Regional Biosafety programme (SARB) is a partnership of USAID with seven Southern African Development Community (SADC) countries - Malawi, Mauritius, Mozambique, Namibia, South Africa, Zambia and Zimbabwe - to provide technical training in biosafety regulatory implementation.[38] SARB is a sub-unit of the USAID-funded Agricultural Biotechnology Support Project (ABSP), whose goal is to support research, product development and policy development for the commercialisation of GE crops. Private partners of ABSP include Monsanto, Syngenta, Pioneer Hi-Bred and DNA Plant Technology.[39] According to USAID, the objective of SARB is to provide the "regulatory foundation to support field testing of genetically engineered products".[40]

3.5 Bid For Africa's Cotton Production

A deliberate strategy is underway, which is targeted at African cotton systems. Since the European Union imposed its de facto moratorium on the commercial use and import of GE crops in 1998, the US has attempted to use the World Trade Organisation's (WTO) framework to strike down the moratorium as an illegal barrier to trade. A number of crops in the US including cotton, are mostly transgenic. Since the EU is one of the largest markets for cotton, control over the cotton industry is an important battle for the US to win. This battle is being fought on many fronts aimed at spreading the commercial planting of GE cotton into Africa's core cotton growing regions.[41]

More than 10 million people in Africa rely on cotton production as their main source of income. Smallholder farmers are the main producers of cotton in

Currently, cotton prices in global market is miserably low due to oversupply mainly from China. In 2004/05 season, the government of Tanzania announced a direct subsidies to local cotton farmers because the price they were receiving was far below the cost of production. The government announced a subsidy of US$ 9.5 million to enable farmers to earn 30 US $ cents per kilogramme.

Africa. Africa is the third largest cotton-exporting region in the world behind the US and Uzbekistan. Egypt is the continent's biggest producer but consumes most of what it produces. Four West Africa countries, Mali, Cote d' Ivoire, Benin and Burkina Faso dominate exports, followed by Zimbabwe. Cotton has also been historically produced in East Africa and these too, are targets for the introduction of GE cotton. The rapid growth in the adoption of GE cotton across the world is used to argue that Africa will miss out on this 'second Green Revolution' if it does not immediately adopt the technology.

In early February 2005, Tanzania announced that its becoming the seventh country in Africa to grow genetically modified (GM) crops for trial when it starts to grow Bt cotton for research in its southern highland regions of Mbeya, Iringa and Rukwa. Cotton farming in this area was stopped in 1968 in order to halt the spread of the red bollworm disease that had affected cotton yields. But the experience in Andhra Pradesh in India shows that Bt growers incurs higher costs in pest management, as compared to those growing conventional cotton varieties with the help of bio-pesticides and natural control agents.[42] Some analysts argue that the claimed success of the GE technology among 5% South African small farmers (in Makathini Flats) who grow GM cotton is not sustainable. They say successes of small-scale farmers who grow cotton in that country are premised on the concentrated institutional, financial and technical support that is unlikely to be replicated in many African countries.[43]

4. GMOs: Silver Bullet for Africa's Poverty and Hunger Quagmire?

Hunger is used by the proponents of GE as a pretext to introduce GE food and seeds into Africa. However, increasing the production of GE food or cash crops will do very little to alleviate hunger or achieve food security in Africa. GE alone does not and cannot form part of the solution to address poverty, hunger and food insecurity in Africa. Hunger and poverty are complex problems requiring appropriate solutions that address social, political and economic factors. These factors include equity, gender equality, power and control over resources. Governments in east, central and southern African region should adopt a precautionary approach to GMOs, while building on alternative sustainable solutions that respond to the needs of consumers and majority smallholder farmers who make 70-80% of the populations in these countries.

"Hold (them) GMOs until proven safe for consumers and conducive for small holder farmers in the region" from PELUM Association stand on GMO, 2004

Box 2 Alternatives to GE to increase food yields/food production and poverty reduction:

- Making trade fair at local/community, national and regional levels and between rich and poor countries;
- Putting in place sound policies on food security and rural development as stipulated in the African Union Declaration, Maputo Declaration of July 2003 on agriculture and food security that was adopted by SADC countries as the Dar es salaam declaration on agriculture and food security May 2004 where heads of states and governments committed themselves to set aside at least 10% of the national budgets for agriculture by 2009;
- Increasing people's participation in formulation, implementing and monitoring of policies;
- Improving rural infrastructures and social services (roads, railways, health centres, schools, energy, and market information centers);
- Promoting agriculture as business, setting marketing structures and promoting small scale agricultural processing;
- Promoting farmer-friendly micro-credit schemes and irrigation in dry lands in the region;
- Intensifying demand-driven rural training and research, as well as promoting rangeland development and management; and
- Promoting post-harvest management and ecological organic farming (permaculture).

Adopted from PELUM Association Stand on GMOs 2004

4.1 Why Africa Should say NO to GMOs

A good number of scholars, scientists, policy makers and smallholder farmers in east, central and southern Africa, argue that the region should take seriously a precautionary principle when it comes to GMOs introduction in the region. The main reason to reject GMOs in the

current arrangements is that it will bring the total loss of control for smallholder farmers and middle commercial farmers as to what to farm and how to farm. This will cause a loss of livelihoods of millions of small farmers in the region. Farming using GE seeds with terminator technology that do not allow farmers to save and re use seeds as they wish, will deny most of our citizens their traditional rights to save, share and use seeds. This in return will require them to pay user fees, as the seeds will be patented. The region will completely lose its food security and food sovereignty altogether. The following, in brief, are the possible risks posed by GMOs to African farmers and the environment.

4.2 Genetic erosion and undermining farmers' rights

Farmers using GMOs will have to sign licensing agreements, in terms of which they undertake not to re-use, re-sell, save, supply or transfer seed to any person. In this way, multinational GE companies will have absolute monopoly over food production and distribution. When commercially bought seed is not saved and not subject to further breeding by farmers to produce improved local varieties; an important method of in situ conservation of plant genetic resources is lost. This method is essential for ensuring food security. Moreover, several farmers' rights are undermined and seriously compromised, including the following:

- Saving, using, exchanging and selling farm saved seed or their varieties;
- Protecting traditional knowledge relevant to plant and animal genetic resources;
- Obtaining a share of benefits arising from the use of genetic resources;
- Participating in making decisions on matters relating to the conservation and sustainable use of genetic resources; and
- Collectively to save, use, multiply and process farm saved seed of protected varieties.

To date, agribusiness giant GE company, Monsanto, has sued more than 100 U.S. farmers, and its "seed police" have investigated thousands of other farmers who have saved seeds. Monsanto has filed 90 lawsuits against American farmers involving 147 farmers and 39 small businesses. U.S. courts have awarded Monsanto more than 15 million dollars. Monsanto has a budget of 10 million dollars and a staff of 75 devoted solely to investigating and prosecuting farmers.[44]

4.3 Adverse economic implications;

The increased dependence of poor countries for their food security on a few multinational companies is a death trap for Africa. The introduction of GE will result in uncertainty regarding the future marketing opportunities elsewhere in the world for African grains and food where GE foods are not accepted. The traditional market for the region, the EU, could also be lost. European consumers have rejected GE foods and public concern

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over these products remains high. Increased cost of production to maintain separate production and marketing channels for GE products in order to segregate them form non-GE products could drive farmers and producers out of business.

4.4 Limited resources left for Research and Development (R&D) for alternative sustainable technologies;

GE has and will continue to absorb scarce R&D resources, leaving behind very little resources if any, for the further development of sustainable alternative technologies that are socially just and ecologically sound. This will precipitate the erosion of valuable traditional methods of farming and related knowledge, and it will undermine the agricultural skills base within farming communities.

4.5 Genetic engineering concentrates power in monopolies;

Concentration of corporate power is the defining feature of today's global economy. The GE industry has converged into new corporate structures that have profound implications for every aspect of commercial food, agriculture, and health. Corporate hegemony is overwhelming governments and subverting national sovereignty. When governments become subservient to corporations instead of citizens, democracy is undermined, diversity is destroyed, and human rights are placed in jeopardy. The growing disparities between rich and poor, both within and between industrialised and developing countries, mirror the trend in corporate consolidation.

Table 1: The top 10 seed companies (2002 sales)

Rank	Company	Country	US$ millions
1	DuPont	US	2,000
2	Monsanto	US	1,600
3	Syngenta	Switzerland	937
4	Seminis	US	453
5	Advanta	Netherlands	435
6	Groupe Limagrain	France	433
7	KWS AG	Germany	391
8	Sakata	Japan	376
9	Delta & Pine Land	US	258
10	Bayer Crop Science	Germany	250

Source: ETC Group (2003) see also " Dominick Eagleton, "Power Hungry Six Reasons to Regulate Global Food Corporations: www.actionaid.org

4.6 GMOs are about corporate profits not social responsibility;

GE companies are involved in the development and sale of GE seeds primarily because they will profit from the sales of seeds and herbicides. These companies are not philanthropic entities or charitable organizations interested in helping the poor. The GE companies at the forefront, like Monsanto, Syngenta and Dow Agro Sciences, are agrochemical companies that sell GE seeds, and are also the holders of patents on GE seeds. The very survival of these companies depend on making profits and ensuring that producers become dependent on them for the purchase, over and over again, of GE seeds and herbicides.

GE companies are involved in the developme nt and sale of GE seeds primarily because they will profit from the sales of seeds and herbicides. These companies are not philanthrop ic entities or charitable organizatio ns interested in helping the poor.

Table 2: The top 10 agrochemical companies (2002 sales)

Rank	Company	Country	US$ millions
1	Syngenta	Switzerland	5,260
2	Bayer	Germany	3,775
3	Monsanto	US	3,088
4	BASF	Germany	2,787
5	Dow	US	2,717
6	DuPont	US	1,793
7	Sumitomo Chemical	Japan	802
8	Makhteshim –agan	Israel	776
9	Arysta LifeSciene	Japan	662
10	FMC	US	615

Source: ETC Group (2003) see also " Dominick Eagleton, "Power Hungry Six Reasons to Regulate Global Food Corporations: www.actionaid.org

Table 3 The top 10 food manufacturers and traders (2002 sales)

Rank	Company	Country	US$ millions
1.	Nestlé	Switzerland	54,254
2.	Kraft Foods	US	29,723
3.	Unilever	UK	25,670
4.	PepsiCo	US	25,112
5.	Archer Daniels Midland	US	23,454
6.	Tyson Foods	US	23,367
7.	Cargill	US	21,500
8.	ConAgra	US	19,839
9.	Coca-Cola	US	19,564
10.	Mars	US	17,000

Source: ETC Group (2003) see also " Dominick Eagleton, "Power Hungry Six Reasons to Regulate Global Food Corporations: www.actionaid.org

4.7 Contamination and liability;

The introduction of GE into the environment will inevitably lead to contamination of non-GE plants through cross pollination, and other organisms in the ecosystem through gene transfer. This may threaten the livelihoods of farmers if they lose markets. Who will pay for such damage? When GMOs damage the environment, it will not be the offending GE company who will suffer the adverse consequences, but the people who live in those environments. This means that whilst GE companies are making profits, the costs are born by the poor and powerless. Even national liability and redress regimes may not assist poor farmers in Africa to recover damages from foreign GE companies. Furthermore, GE companies may claim compensation from small farmers for violation of their patent rights if the fields of the farmers become contaminated with GE seeds. This has already occurred in Canada where Monsanto sued farmer Percy Schmeiser and more than 100 other farmers, as has been discussed in section 4.2.

4.8 Theft of community knowledge and genetic resources;

Farmers have developed their knowledge in respect of genetic resources over a long period of time. These same genetic resources are being used to develop GMOs. But more than that, GE companies are acquiring patents over such genetic resources. This is theft of resources and knowledge-biopiracy. In any event, such knowledge cannot and should not be owned. Knowledge belongs to all of humankind. No one can claim to have a truly original idea. All ideas come from knowledge that is deeply embedded in the history of societies.

4.9 Health Risks;

Scientists the world over, have consistently been demonstrating the shortcomings of the current food safety testing and assessment being done by the GE industry. Many unanswered questions remain concerning the risks to human and animal health from GE food. For instance, scientists have queried the possibility of antibiotic resistant genes from GE food being built up in the consumer's body, and thereby leading to resistance to antibiotics. Furthermore, there is also a possible transfer of allergens to foods. Serious questions are also being asked about the regulatory standards used to approve GE food as being safe. It is now known that even the US Food and Drug Administration does not oversee an independent, mandatory safety assessment process to determine the impact of GMOs on human health. It merely oversees a voluntary system under which corporations submit their own safety procedures for their products.[45]

4.10 Environmental Risks;

The introduction of GMOs may pollute and affect natural environments and ecosystems in Africa. This in turn, is likely to disrupt organic farming operations, which is taking off in several parts of Africa. The Food and Agriculture Organisation (FAO) has raised particular concern that out crossing could lead to the development of more aggressive weeds or wild relatives with increased resistance to diseases or environmental stresses and thereby, upsetting the ecosystem balance. Biodiversity may also be lost, as a result of the displacement of traditional cultivars by a small number of GE cultivars.[46] Another eventuality is that resistance to certain herbicides could be passed on to weeds. These "super weeds" would then become hard to remove from the fields. Past experiences with the introductions of new species to the environment where they are not naturally present have shown that problems only manifest themselves over a long period of time. Examples are the Nile Perch and the water hyacinth in Lake Victoria in East Africa.

4.11 Ethical Considerations;

Numerous people and organizations have strongly raised ethical objections to GE. Many feel that GE is meddling with nature and scientists are "playing God" with food, health and the environment. As Peter Henriot, from Jesuit Centre for Theological Reflection in Zambia wrote "the GMO approach to agriculture departs significantly from the natural ways, while claiming to be much more efficient, modern, and helpful for feeding hungry people around the world."[47]

5. Prioritising Biosafety in Africa

Under the international multilateral arrangements, countries in the world are reserved with the right to ensure that they safeguard health of their citizens, the environment and biodiversity against the risks posed by GMOs. These arrangements are in the Cartagena Protocol on Biodiversity.

5.1 The Cartagena Protocol on Biosafety

The Cartagena Protocol on Biosafety finally came into force after years of negotiations on September 11, 2003. This was despite sustained attempts by the US and key GE producing and exporting countries like Argentina, to block the progress under the Protocol. The Biosafety Protocol lays down measures that the international community must adopt in order to protect human health, the environment and biodiversity from the risks posed by GMOs. It is designed to ensure that the global community adopts common minimum safety measures when GMOs are transported around the world, either as research material, pharmaceuticals, or seeds. Most importantly, it allows countries to refuse imports of GMOs based on the precautionary principle.

Biosafety refers to a set of measures aimed at ensuring that the development and use of GMOs do not negatively affect plant, animal or human health, genetic resources or the environment.

Several countries in east, central and southern Africa are parties to the Biosafety Protocol, including: Tanzania, Lesotho, Ethiopia, Rwanda, Zambia, South Africa, Botswana, Mozambique and Uganda.[48]

BOX 3 The Cartagena Protocol On Biosafety

The Biosafety Protocol came into force on 11th September 2003, and to date, 111 countries have become Parties to the Protocol. The major producers and exporters of GMOs: the United States, Argentina, Canada and China, are not Parties to the Protocol.

The central regulatory element of the Biosafety Protocol is the Advanced Informed Agreement procedure, which applies to the first transboundary movement of GMOs for intentional introduction into the environment.
The procedure seeks to ensure that importing countries have the opportunity to assess the environmental and human health risks associated with a GMO and take a decision based on the precautionary principle, before agreeing to its import. It obliges exporters to notify importers in advance of the first shipment and to supply certain prescribed information concerning the GMO. Receipt of this information needs to be acknowledged within 90 days. Within 270 days the importing Party must communicate its final decision with regard to the future status of the GMO. This decision is to be based on a risk

assessment and may either approve or prohibit the import of the GMO, request further information, or extend the deadline by a defined period of time. In each case reasons for the decision need to be stated. Both the importing and exporting Parties may, at any time, initiate a review and change of the decision, in the light of new scientific information.

5.2 Precautionary Principle

The Precautionary Principle has evolved in international and national environmental law and jurisprudence since the 1970s to specifically address situations where there is lack of scientific certainty or consensus. In short, the precautionary principle provides that uncertainty regarding serious potential harm (i.e. the harm does not have to be proven) is not a valid ground for refraining from preventive measures.[49]

The Biosafety Protocol contains 2 extremely important Articles dealing with the Precautionary Principle: Articles 10(6) and 11(8) provides as follows "*the lack of scientific certainty due to insufficient relevant scientific information and knowledge regarding the extent of the potential adverse effects of a (Living Modified Organism) LMO on biodiversity, taking into account risks to human health, shall not prevent a Party of import from taking a decision, as appropriate, with regard to the import of the LMO in question.*"

The Precautionary Principle's application to GMO regulation is absolutely appropriate. Indeed, the very foundation of biosafety regulation rests with the application of the Precautionary Principle.

As has already been discussed in section 1.2 and 1.6, GMO applications are encumbered by uncertainties at different levels: technical uncertainty, e.g., lack of scientific understanding; epistemological uncertainty, e.g., limited knowledge concerning properties of the GMO in question and methodological uncertainties, e.g., concerning choice of methods for detection and identification of effects. Compounding this situation is uncertainties related to the occurrence, magnitude, timing, and significance of the level of potentially adverse effects.[50]

Currently, the United Nation's Environment Program (UNEP) and the Global Environmental Facility (GEF) are supporting several African countries to establish national biosafety frameworks, mainly to enable them to implement the Biosafety Protocol. It is anticipated that within the next 12-18 months, several countries in Africa will have national biosafety frameworks in place.

The smallholder farmers and civil society groups in Africa should ensure that they are fully involved in the UNEP/GEF biosafety capacity building projects. At the same time, groups should be on the alert for other biosafety projects that are designed to undermine biosafety

In short, the precautionary principle provides that uncertainty regarding serious potential harm (i.e. the harm does not have to be proven) is not a valid ground for refraining from preventative measures.

Table 4. UNEP-GEF Biosafety Projects; Ratification of Biosafety Protocol[51]

Country name	Pilot phase	Development project	Implementation project	Signature	Date ratified biosafety protocol
Angola	-	-	-		
Botswana	-	1 August 02-	-	1 June 2001	11 June 2002
Burundi	-	29 September 04	-	-	-
Congo, DR	-	29 April 02-	-	-	-
Kenya	1997-1999	-	2002-2005	15 May 2000	24 January 2002
Lesotho	-	1 September 02-31 August 04	-	-	20 Sept 2001
Malawi	-	-	-	24 May 2000	11 April 2002
Madagascar	-	-	-	14 September 2000	24 November 2003
Mauritius	-	1 September 02-	-		11 April 2002
Mozambique	-		-	24 May 2000	21 October 2002
Namibia	1997-1999		2002-2005	24 May 2000	
Rwanda	-	10 January 03-	-	24 July 2004	22 July2004
Seychelles	-	1 August 02-	-	23 January 2001	13 May 2004
South Africa	-		-	-	14 August 2003
Swaziland	-	17 February 03-	-	-	
Tanzania	-	1 September 02-14 October 04	-	-	24 April 2003
Uganda	1997-1999	-	2002-2005	24 May 2000	30 November 2001
Zambia	1997-1999	-	-	-	27 April 2004
Zimbabwe	-	2 July 02-	-	4 June 2001	-

Source: www.biodiv.org/biosafety/signinglist and www.unep.org.

5.3 Important African initiatives on Biosafety

Africa has taken steps towards addressing regulatory and policy issues relating to GMOs. The African Union has developed an African Model Law on Safety in Biotechnology, which is strongly based on the precautionary principle. At a Summit of the African Union held in Maputo in July 2003, it strongly urged governments to use the African Model Law as a Guide for the formulation of national laws on biosafety. However, an expert committee on biodiversity, biotechnology and biosafety has recommended that African countries consider a moratorium on the introduction of GMOs until adequate capacity has been built to address the risks posed by GMOs.

African countries are strongly urged to adopt the African Model Law and subscribe to the common environmental standards and protective measures established by it. In doing so, African countries will demonstrate to its own citizens and the international community that it is committed to protecting Africa's people, environment and biodiversity.[52]

5.4 In Southern Africa

In southern Africa, the 14-member countries organisation, SADC, in August 2003 agreed on common guidelines to safeguard member states against potential risks in the areas of food safety, contamination of genetic resources, ethics, trade and consumer concerns.

The guidelines, that were adopted in Dar es salaam, Tanzania highlights four major areas that were approved as interim guidelines. These are:

- ☑ *Handling of Food Aid* - the guideline highlights among other things that the food aid consignments involving grain or any propagative plant material that may contain GMOs be milled or sterilized prior to distribution to beneficiary population;
- ☑ *Policy and Regulations* - argues that each member state develop national biotechnology policies and strategies and expedite the process of establishing national biosafety regulatory system;
- ☑ *Capacity Building* - encourages member states to commission studies on the implications of biotechnology and biosafety on agriculture, environment, health and social-economics as part of an integrated monitoring and evaluation system;
- ☑ *Public Awareness and Participation* - urges member state to develop public awareness and participatory programmes on biotechnology and biosafety that involve all stakeholders.[53]

6. Forging Ahead: Recommendations

6.1 Small-scale farmers are Africa's last line of defence against the GMO onslaught

Civil society groups, the majority of scientists and general public in the east, central and southern Africa, who see the threats posed by GMOs, should empower Africa's small-scale farmers so that they are able to make informed choices and ward off the introduction of GMOs. The real debate is about a future for African agriculture that focuses on real alternatives that offer meaningful solutions to alleviate hunger and poverty in socially just and ecologically sustainable ways. Thus;

- Civil society movement in the region should be seen strongly supporting farmers' struggle for sound agricultural and rural development policies, for the improvement of rural infrastructures and social services, education, training and market opportunities.

- African governments should be advised to immediately impose a moratorium on the introduction of GMOs in all its forms. GMOs have no place whatsoever in African agriculture in its current form and conditionalities attached to.

- Governments, the private sector and farmers in the region must redouble their energy and resources in committing to sustainable agriculture. Urgent and increased financial support is needed for research and crop development, animal husbandry, poultry, beekeeping and fisheries, horticulture, improved rural infrastructure and essential social services, such as health care, access to water, energy and education.

Box. 4 What is sustainable agriculture?

Sustainable agriculture is a farming practice that emphasises the uses of local or internal resources and knowledge rather than being over-reliant on external inputs. It treats agriculture as a managed part of the wider ecology that harnesses natural processes, minimises environmental degradation, and involves collective learning, decision-making and action. Sustainable agriculture aims to serve the needs of the farmer and the local community and markets, for local food security, for local cultural needs and preferences and for more equitable distribution of assets, income and influence.

. **Source**: *Kevan Bundell, Forgotten Farmers: Small Farmers, Trade and Sustainable Agriculture, June 2002.*

Box 5. What is Food Security?

There are many definitions of food security. The Food and Agriculture Organisation (FAO) definition was developed during the world food summit in 1996. It stresses on the accessibility of food by people all the time.

According to the World Food Summit 1996, food security is ensured; When all people, all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and health lifestyle" - *www.fao.org/waicent/faiinfo/economic/esa/fs-en.htm*

A. Oshang developed another definition on food security in 1985. His definition emphases on having structures that allow society and individual to withstand crises.[54]

According to A. Oshaug "A society which can be said to enjoy food security is not only one which has reached a food norm…. but which has also developed the internal structures that will enable it to sustain the norm in the face of crises threatening to lower the achieved level of food consumption".

The third definition is giving three key components of food security; these are food **availability**, food **access** and food **use and utilisation** *(see also Forum for Food Security in Southern Africa, 2004, Consultation draft, "Achieving Food Security in Southern Africa: Policy Issues and Option" at www.odi.org.uk/food-foodsecurity-forum) and www.ifad.org/gender/thematic/rural/rural-2.htm*

Thus food security entails the following:
Its availability: this consist of the sum of domestic food production and food imports both commercial and food aid
Food access: this is all about people's entitlements to food, namely the amount they can produce, and the amount they can purchase or receive.
Food use and utilisation: this is both the way food is prepared and distributed between individuals within the household or family and the individual capacity to absorb and utilize nutrients in the food consumed

Box 6. Some Alternative Solutions to Address Hunger in Africa

Organic agriculture Organic farming is an excellent option for small-scale farmers, because it does not require expensive inputs, and can increase yields, improve soil fertility, prevent soils erosion and improve nutritional content of food. Simple techniques can dramatically increase food production while lowering farmers' production costs. Such methods include crop rotation, intercropping, applying compost and manure, mulching, and creating an ecological balance so that pests do

Thus food security entails the following: Its availability: this consist of the sum of domestic food production and food imports both commercial and food aid Food access: this is all about people's entitlements to food, namely the amount they can produce, and the amount they can purchase or receive. Food use and utilisation: this is both the way food is prepared and distributed between individuals within the household or family and the individual capacity to absorb and utilize nutrients in the food consumed

not get out of control. These methods are sustainable at the farm level because they can be carried out indefinitely, without damaging the environment. Nature has much to offer farmers, it we work with her instead of against her. There is growing market for organic products in the world. Farmers should be encouraged to grow organic products to increase their income security and improve their livelihood.

Biological control mechanisms
Instead of using increasing amounts of expensive and harmful chemicals to combat pests, biological control should be applied. The principle of biological control creates an ecological balance for pest management. It is a natural method of fighting pests, and encourages sustainable predator/prey systems to keep the population of the pests under control.

Seed saving and multiplication
Small-scale farmers should save their seed to protect agricultural biodiversity for the future. This is important because farmers need seed that is suitable for their local eco-systems, taste and climate.

Rainwater harvesting and small-scale irrigation systems
One of the main problems of agriculture in the region is not land but water. Africa needs to improve water management through development of efficient and appropriate irrigation systems that enhance small-scale farming. For example, farming through rainwater harvesting, small-scale gravity flow systems or pedal pumps can offer effective community-managed solutions. Management of soil water where direct irrigation is absent is crucial and critical for rain-fed agriculture. Techniques including use of compost, mulching, and agro-forestry are useful and should be enhanced. Construction of rain water storage, control and management facilities e.g. retention ditches, stone barrier, cut-off trenches etc. are crucial for maximizing the use of surface run-off water and hence should be encouraged.

Diversification of farm enterprises
Small-scale farmers should be encouraged to diversify enterprises on their farms. This may include large and small livestock, aquaculture and income-generating commercial enterprises.

Improving on post-harvest management
It is estimated that over 20 per cent of the processes, which include handling, storing and processing. Efforts should be made to improve storage facilities and skills of farmers regarding post harvest management.

Source: IFOAM & PELUM Kenya Booklet, Genetic Engineering In Agriculture, A focus on Africa Book 2 page 11.

7. Concluding Remarks

Many development actors and farmers perceive advancement in agricultural technology including Biotechnology, as an opportunity for improving livelihoods, averting hunger and malnutrition and fighting poverty. However, in its current arrangements, GM cannot avert hunger and ensure sustainable agriculture and sustainable development in Africa. Problems of hunger and poverty in east central and southern Africa are complex and might not be solved by increasing productivity alone. GM cannot improve infrastructure, roads, or markets. In order to improve food security and bring about food sovereignty, the region needs to:

- Restore support to small scale farmers and improve rural infrastructure.
- Increase financing in agriculture and public research institutes, and
- It needs to enhance the manufacturing sector, especially that which links to agricultural development. Governments, research institutions and farmer groups should emphasise rainwater harvesting and small-scale irrigation systems.
- Rich countries also need to stop subsidising their farmers and they should improve markets access for smallholder farmers from the South.

Governments and civil society organisations in the region should facilitate capacity development of smallholder farmers to enable them interpret, influence, track and monitor resources set aside for agriculture and rural development from national budgets. People in the region should;

- Hold governments responsible and push them to reach the 10% national budgets allocation for agriculture and food security, as it was agreed by leaders in the African Union Maputo Declaration, and the Dar es salaam/SADC Declaration on agriculture and food security in 2003 and 2004, respectively.

" Food Sovereignty is the right of peoples, communities and countries to define their own agricultural, labour, fishing, food and land policy which are ecologically, socially, economically and culturally appropriate to their unique circumstances" via campesina

Science and technology is important for development in the agricultural sector. But not every development in science and technology tallies with the local needs and promotes basic rights for the people. A handful of multinational seed and agrochemical companies are advocating for the introduction of GMOs in the region for their own benefits. The move might deprive rights of millions of small-scale farmers and wipe out our food sovereignty dream. If this fast moving trend is not arrested by the people and governments in the region, we would soon witness the livelihoods of millions of smallholder farmers destroyed and our countries receiving orders from those who control seeds and the food production chain. The big question remains; what will then happen to the poor people in the region?

People in the region should hold governments responsible and push them to reach the 10% national budgets allocation for agriculture and food security, as it was agreed by leaders in the African Union Maputo Declaration, and the Dar es salaam/SADC Declaration on agriculture and food security in 2003 and 2004, respectively.

Glossary of Biotechnology and Genetic Engineering

1. Biotechnology - means the use of an organism to perform a function, like making cheese or wine. Biotechnology is also used to refer to genetic engineering.

2. Bt - Bacillus thuringiensis is a naturally occurring microorganism that produces a toxin that only kills organisms with alkaline stomachs, namely insect larvae. This toxin has been used for biological control purposes for decades. The genetic information that encodes the toxin was identified and genetically engineered into plants to make them insect tolerant.

3. DNA - Deoxyribonucleic acid is the chemical building block of the genetic information in the cell, genes; it specifies the characteristics of most living organisms. The DNA is usually in the form of two complementary strands.

4. **Ecosystem** - is the living system that includes all organisms in a "natural community" that live and interact with their environment.

5. **EU -** European Union.

6. **FAO** - United Nation's Food and Agriculture Organisation.

7. **Gene -** means the segment of DNA specifying a unit of genetic information; an ordered sequence of nucleotide base pairs that produce a certain product that has a specific function.

8. **Gene companies** Big multinational Genetic Engineering (GE) companies

9. **Gene flow -** means the incorporation of genes from one organism into the complement of genes in another population of organisms.

10. **Genetic engineering -** is a set of laboratory techniques for isolating genetic material from organisms, cutting and rejoining it to make new combinations, multiplying copies of the recombined genetic material (also called recombinant DNA) and transferring it into organisms, bypassing the process of reproduction. Genes can be exchanged between species that would never interbreed in nature.

11. **GMO -** is short for genetically modified organism, also known as genetically engineered organism, or transgenic organism. It carries genetic material that has been made in the laboratory and transferred into it by genetic engineering.

12. **Hybridisation -** means the joining of two complementary strands of

DNA, or of DNA and RNA, to form a double stranded molecule. 2. Process of sexual exchange between two plants to produce hybrid plants.

13. **IMF -** International Monetary Fund.

14. **Intellectual Property Rights** (IPRs) - includes patent rights, plant variety protection certificates, unpublished patent applications and inventions that may or may not be legally protectable.

15. **Patent -** is the legal protection of a new invention for a limited period. The invention cannot be used without the permission of the patent holder and the payment of royalties.

16. **PELUM -** Participatory Ecological Land Use Management.

17. **R& D -** research and development.

18. **Roundup Ready -** Roundup Ready is GM plants that herbicide tolerant. Also is Monsanto's brand name for the poison/herbicide that the GMOs are meant to tolerate

19. **Transgenic -** is used interchangeably with the term "genetically engineered."

20. **US -** United States of America

21. **USAID -** United States Agency for International Development.

22. **WFP -** World Food Programme.

23. **WTO -** World Trade Organisation

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ABOUT PELUM Association

PELUM Association is a regional network of over 160 civil society organisations in east, central and southern Africa, working towards sustainable agriculture, food security, and sustainable community development in the region. The Association, launched in 1995, is currently working in ten countries in the region, namely, Botswana, Kenya, Malawi, Lesotho, Rwanda, South Africa, Tanzania, Uganda, Zambia and Zimbabwe.

PELUM Association's long-term objectives are to build the capacity of farming and rural community groups in order to enable them to accumulate ecological skills, stimulate farmer learning and inspire experimentation and innovation in their quest to achieve food security. In order to attain these objectives, PELUM Association facilitates learning and networking, participatory research, capacity building and lobbying and advocacy for small-scale farmer groups and civil society organisations.

This Policy Briefing Paper is aimed at providing information to farmers, extension workers, ordinary citizens and policy makers in east, central and southern Africa about the risks posed by genetically modified organisms (GMOs). In this regard, this briefing provides cogent arguments why the region should take a precautionary approach to GMOs.

In doing so, this briefing illustrates that the risks posed by GMOs are numerous and multi-faceted. However, the most ominous risk of all would be the loss of power by farmers to control vital components of their means of production and the production chain. Corporate concentration of power to control the food chain is an increasing threat. This means that if the trend is not arrested, including rejecting of unsuitable technology for smallholder farmers, the GMO industry will eventually control food production from seeds to supermarkets. A handful of seed and agrochemical companies will determine what we farm or eat and how we farm and eat. Then, what will happen to the poor of the world?

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