# Genetically Modified Food:
# The Impending Disaster

**Statement of the Catholic Bishops of South Africa 14nov01**

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## 1. Introduction

Many thousands of hectares in South Africa have been planted with genetically modified (GM) crops. And because we have no proper labelling of foodstuffs, we do not know how much of the food we eat everyday has been contaminated by genetic manipulation.

Nor do we have any comprehensive understanding at this stage of the consequences of eating genetically engineered (GE) food. There have been reports suggesting terrifying and irreversible consequences for human beings and for the environment, but even more horrifying is the fact that big companies have been allowed to put these foods on the market long before adequate scientific monitoring of the long-term consequences has been carried out.

This paper attempts to cover some of the main issues and controversies relating to the genetic modification of food, highlighting real and potential dangers, looking at the economic and financial interests at stake, and providing an overview of the legislative position adopted here and abroad.

## 2. The Need for a Freeze

In November 2000, the Southern African Catholic Bishops' Conference (SACBC) issued a press statement supporting the campaign calling for a five-year freeze on genetic engineering and patenting in crop and food production. The Bishops' stand is mainly based on the precautionary principle. So far, no rigorous long term testing has been carried out to ascertain the effects of genetically engineered crops and foods on humans, animals, plant-life and soil. Doubts about the safety of the new bio-technologies have been confirmed by the results of scientific studies and many scientists are warning that genetically modified organisms (GMOs) pose risks to health, for example, increasing the incidence of allergies, toxic reactions and antibiotic resistance.

In 1999 the British Medical Association called for an open-ended moratorium until there is greater scientific certainty about the safety of GM seeds and derived products. In February 2001 the Royal Society of Canada added its voice to the call for a moratorium. Many scientists around the world have joined the call, along with farming organisations, especially in the USA, which are advising farmers to discontinue GE practices.

Because safety-testing on these foods is not strict, their long-term effects on our health and on the environment are unknown. Unlike chemical or nuclear contamination, new living organisms, bacteria and viruses will be released into the environment to reproduce, migrate and mutate. They will transfer their new characteristics to other organisms. These changes can never be undone or contained. The effects of genetic mistakes are largely irreversible and irretrievable. Therefore, at this stage - as the Bishops declare in their statement, "It is morally irresponsible to produce and market genetically modified food."

## 3. The Major Hazards

### 3.1 Direct Insertion

In their use of recombinant DNA technology, genetic engineers take genes from an organism and inject them into a totally different organism. This is done across all naturally determined species boundaries. This is radically different from cross-breeding, which uses natural reproductive mechanisms, which only combine genetic material from the same or closely related species. For example, by cross-breeding (or hybridising) a variety of maize which is drought-resistant with another variety which produces well, farmers in dry areas can improve their crop. But the product remains maize, and is uncontaminated by other species.

Since a specific function is targeted and transferred to a given organism, gene technology is said to be precise. However, the gene insertion techniques can give unpredictable results, as it is uncertain where the inserted foreign genes will connect with the host organism's DNA, and for each insertion this will be different. Such insertions will in some way destabilise the DNA, cell-function or overall health of the host organism.

Genetic engineering is still a very imprecise science, and scientists concede that they are still very ignorant about DNA. The regulated interaction of genes is very important and complex. This, as well as the role of individual genes within the overall functioning and viability of an organism, is hardly understood.

As Professor Richard Lacey, an expert in food safety, explains, to meet adequate scientific standards, the resulting organism arising from each individual insertion of foreign genes should be tested over a very long period, in the form of a whole food. A small sampling of GM plants of the same kind does not suffice, nor does comparative testing of just some chosen aspects of the total organism's composition.

Even rigorous testing may not ensure safety. The targeted foreign gene function is promoted in the host organism through the agency of yet another foreign viral promoter gene. Such gene activity then works outside the normal regulatory system of the host organism and therefore poses further unpredictable dangers that may manifest over time.

A seemingly successful transfer of a particular function should not be confused with a guarantee that there would be no side effects. For example, Roundup-Ready Soy, the Monsanto company’s genetically engineered soybean, has an extra gene to help the plant resist Monsanto's herbicide, Roundup. When Roundup is sprayed on the Roundup-Ready Soy the gene is activated, altering the chemistry of the plant so that it survives the spraying. Since that plant's behaviour is changed, could something in its chemistry also be affected? Could that something be toxic? Perhaps that toxic effect may only become apparent after some years. The immediate survival of the plant does not guarantee that it is safe to eat.

Another important aspect to be kept in mind is the impact of GMOs on the balance of the eco-system. For example, potatoes that have been genetically engineered to resist attack by aphids certainly poison the aphids, but then ladybirds that eat the aphids are also poisoned. Ladybirds are a natural control for aphid populations, so weakening the ladybird population would open the door for the aphid population to grow. Where does the chain end? What are the long-term effects on the ecology? At present, we cannot answer these questions.

### 3.2 Pollution by Cross-Pollination

Genetically engineered crops can cross-pollinate with nearby natural plants. For example, genetically engineered canola readily cross-pollinates with natural canola and wild weedy relatives up to 2.5 kilometres away. An experiment performed in France demonstrated that the herbicide resistant gene in genetically engineered canola is transferred to wild radishes and persists through at least four generations.

Although bio-technology has the capacity to create a greater variety of commercial plants, the trend set by transnational corporations is to create broad international markets for a single product. This encourages genetic uniformity, thereby narrowing the genetic base of our food resources. Genetic uniformity leads to vulnerability. In the case of the Irish potato famine in the 19th century, for example, genetic uniformity in the potato crop meant that all the potatoes were susceptible to a single disease. The same potato blight also struck South America, but there the farmers had planted as many as 46 varieties of potatoes; this genetic diversity gave them protection, as the disease affected only a few varieties.

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 whatever today.

### 3.3 Herbicides and Pesticides

As crops and weeds naturally begin to develop resistance, and herbicide-resistant traits are transferred from genetically engineered crops to other plants through cross-pollination, higher and higher doses of chemicals will be needed to be effective. Some scientists estimate that herbicide use will triple, resulting in even more chemicals in our food and water. Repeated applications of a single herbicide encourage plants to develop resistance within a very short period of time. Sooner or later, weeds will begin to develop resistance to broad-spectrum herbicides such as Roundup, and more applications of the herbicides will be required.

Since herbicide-resistant GE crops lead to greater herbicide use, the risk of disease for people and animals increases. For example, cancer can result from exposure to high levels of herbicides like bromoxynil (Rhone-Poulenc's Buctril) and glyphosphate (Monsanto's Roundup). Researchers are warning that bromoxynil bio-accumulates because it is fat-soluble. Rat and rabbit studies have shown birth defects, other developmental disorders in foetuses, tumours and carcinomas at levels ranging from twenty to thirty parts per million. Glyphosphate exposure, on the other hand, can triple the risk of non-Hodgkin's lymphoma, say the cancer specialists. Genetic engineering appears to be replacing chemical pesticide sprays with plants which themselves contain pesticides. Crop plants have now been engineered with the gene for the Bt toxin (Bacillus thuringiensis, a soil bacterium which produces a toxin which is highly valued by organic farmers) to give them an in-built insecticide. In marked contrast to the occasional application of the Bt in organic farming, this transgenic Bt toxin is produced in the plants all the time they are growing. This means that insects are continually exposed to the toxin, and are therefore under constant pressure to develop resistance. Bt resistance has already been noticed among some insect populations. The cultivation of genetically engineered Bt cotton, maize and potatoes could lead to the wanton destruction of Bt, the world's most

important biological pesticide. It is ironic that the only natural pesticide available is now under threat of being rendered ineffective.
Little wonder then, that corn and potatoes engineered to produce toxins that kill insects are now classified by the Environmental Protection Agency in the USA as pesticides, rather than vegetables.

### 3.4 Safety Fears

Safety testing of genetically engineered foods is largely dictated by a concept of 'substantial equivalence'. The supporters of this view claim that a GE crop has similar chemical characteristics to the traditionally produced counterpart. The tests commonly accepted as sufficient to establish substantial equivalence focus on known nutrients, toxins and allergens. The use of substantial equivalence as a basis for risk assessment is seriously flawed, since it focuses on risks that can be anticipated on the basis of known characteristics, but ignores unintended effects that may arise from genetic modification. DNA is nature's blueprint for creating the individuality of an organism. Genetic engineering manipulates an organism at the very source of its uniqueness and changes it fundamentally and essentially.
Genetically engineered food may contain unexpected new molecules that could be toxic or cause allergic reactions. Genetic engineering may transfer new and unidentified proteins from one food into another, triggering allergic reactions. These products are not being thoroughly tested before they arrive on the grocery shelves; they are being tested on people. In the United States, a quarter of all people tested have reported an adverse reaction to one or more foods: dairy products, eggs, wheat and nuts.
For people who are unable to tolerate certain proteins, eating foods containing even traces of these proteins can cause allergic reactions, which may range from minor discomfort to serious illness and even death. In GE, genes are transferred from one organism to another, resulting in the production of new proteins. If a new protein happens to be one that causes an allergic reaction, food that was previously safe for a person could become dangerous for such an individual. The firm Pioneer Hi-Bred International engineered soybeans with a gene from a Brazil nut in the hope that it would improve the soy bean's protein content. Researchers at the University of Nebraska tested these soybeans on samples of blood serum taken from people who were allergic to Brazil nuts. These tests indicated that if these people had eaten the soybean, they would have suffered an allergic reaction that could have been fatal.

## 4. Improve or Destroy?

Genetic engineering is a new technology which, according to its promoters, was created to improve food production and increase yields to feed the growing world population. During a meeting of UN Food and Agricultural Organisation in 1998, 24 delegates from 18 African countries representing their respective governments, declared:
"We do not believe that agro-companies or gene technologies will help our farmers to produce the food that is needed in the 21st century. On the contrary, we think it will destroy the diversity, the local knowledge and the sustainable agricultural systems that our farmers have developed for millennia and that it will thus undermine our capacity to feed ourselves."
According to some studies, none of the GE seeds significantly increase the yield of crops. Examining more than 8000 field trials, researchers have found that Roundup-Ready soybean seeds produced fewer bushels of soybeans than similar conventionally bred varieties. Far from

being a solution to the world's hunger problem, the rapid introduction of GE crops may actually threaten agriculture and food security. Widespread adoption of herbicide-resistant seeds may lead to greater use of chemicals that kill weeds. In this way, many non-crop plants used by small farmers in the Third World as supplementary food resources and as animal feed will be phased out. In the United States, the Fish & Wildlife Service has found that Roundup Herbicide already threatens seventy-four plant species.

Biological pollution from GE organisms may be another problem. The agrochemical firm Monsanto is poised to acquire the rights to a genetic engineering technique that renders a crop's seed sterile, ensuring that farmers are dependent on Monsanto for new seed every year. Farming in the Third World could be crippled if these genes contaminate other local crops that the poor depend on. Half of the world's farmers depend on their own saved seed for each year's harvest.

Even if GE were to produce a higher yield, the fact is the world already produces 50% more food than it needs, and yet one in seven people suffers from hunger. This is not because there is a lack of food, but because it is not accessible to them as a result of unjust economic conditions. At the height of the 1984 famine in Ethiopia, for example, oilseed rape, linseed and cotton seed were being grown on prime agricultural land to be exported as feed for livestock to the UK and other European countries. Other products exported to Europe from Ethiopia during the famine included coffee, meat, fruit and vegetables.

The problem however is not just one of distribution. With the massive increase in population in recent decades, there is a corresponding decrease in the amount of agricultural land available. Hundreds of thousands of hectares are being paved over every year by urban sprawl and industrial growth. Another reason for loss of land is degradation of the soil due to erosion, contamination or compaction.

Ecologically-sensitive agricultural systems address these critical issues in various ways: through inter-cropping (planting different crops together); crop rotation; and the cultivation and preservation of bio-diversity. It is possible to improve nutrient-recycling and the preservation of natural resources through the use of cover crops, organic matter such as manures and composts, and the promotion of a healthy soil. Long-term studies of organic farming methods in the USA have produced encouraging results; figures from the first fourteen years show that comparable yields can be obtained without the use of chemical pesticides or fertilisers. It has also been found that yields in organic corn are not reduced as much as conventional corn during drought years, suggesting that the organic systems may be more resistant to drought-stress.

These sustainable agricultural systems are able to provide substantial increases in yields, whilst encouraging the use of local resources and helping communities to become more self-reliant. In contrast, multinational corporations whose business is selling seeds, fertilisers and chemicals, aim to tie farmers to external inputs, which come only from them, at their price. So far the only beneficiaries of the new bio-technologies are the big agrochemical companies.

**5. Patenting**

Transnational companies have acquired the right to patent seeds that they have been able to modify genetically. This means that farmers will be tied into contracts to buy both seeds and chemicals, and will not be allowed to plant the farm-saved seed. This is already causing

widespread social problems and food insecurity, particularly in developing countries. The patenting of GM seeds will deepen the plight of farmers around the world who are already struggling. If a farmer switches to a genetically engineered seed, that farmer has to sign a gene licensing agreement, which specifies royalty fees and dictates the seed, fertiliser and chemicals to be used. These agreements prohibit the storing of seed for the following season. For example, farmers who grow Monsanto's genetically engineered soybeans sign a contract that opens them to prosecution if they use any herbicide formulations other than the company's Roundup .

This trend towards patenting foods must be rejected. Firstly, it further legalises technology that is harmful to the environment, and thus contradicts the duty of human beings to care for the earth and to ensure that our natural resources are conserved for future generations. Secondly, it undermines the right to food security, which must always take precedence over profits and patents. Food is not just commodity or product like any other, it is fundamental to life itself. The famous comment of the Cree Chief Seattle is appropriate:

"Only when the last tree has died and the last river been poisoned and the last fish been caught will we realise we cannot eat money".

Currently 80% of the patents on GM foods are owned by just 13 transnational corporations (TNCs). Like other forms of intellectual property rights such as copyright and trademarks, patents are a form of incentive and reward for inventions. Such rights have traditionally been associated with non-living inventions in industrialised and market-based economies, and have been little used in agriculture. But companies engaged in bio-technology have been pressing for the adaptation of classical intellectual property law to cover life forms, as being no different from any other form of technology. In 1985, the US Patent & Trademark Office allowed genetically modified plants, seeds and plant tissue to be patented. The patenting of any life forms, modified or not, should be contested. Corporations can engage in 'bio-piracy', by acquiring the knowledge of generations of indigenous farmers, and then, after subjecting this knowledge to scientific analysis, taking out patents on the resulting product. We know that each 'improvement' in farm crops, whether by hybridisation or genetic modification, tends to reduce bio-diversity and to marginalise those crops which in the present agricultural and economic context are regarded as unprofitable. These varieties are also the traditional crops on which the poor depend.

Care of the earth, according to an attentive interpretation of what the Bible (Genesis Chapter 2) tells us, includes not only the responsible use of creation, but also its preservation. A turning point occurred when patent applications involving living organisms began to be filed on a regular basis. There has to be a distinction between living and inanimate things. Firstly, animals and plants are creatures that have a life of their own. They are not products of industry or mere objects for human use. Secondly, the addition of two or three genes to an animal with perhaps a hundred thousand genes does not turn the animal into a human invention. An animal, plant or micro-organism owes its creation ultimately to God, not to human endeavour. In genetic engineering, moreover, only a tiny fraction of the make-up of the organism can be said to be a product of the scientist. The organism is still essentially a living entity, not an invention. Despite the considerable investment involved, the identification of a gene's function is not an ethical

ground for claiming exclusive rights. Even though intellectual effort has been used, it is of the nature of discovery, not of invention.

**6. Labelling**

Everyone has the right to choose what to eat, and therefore, to know what is contained in the foods offered for sale. At this stage in South Africa, foods that have been genetically engineered are available on the supermarket shelves together with other products, with no distinguishing label. Most processed food imported from USA and Europe contains genetically engineered ingredients, mainly soya oil, lecithin, canola and corn syrup. It should be noted that milk on South African shelves may contain genetically modified bovine growth hormone, known to cause cancer in humans and mastitis in animals . Without labelling, consumers lose their freedom to choose what they will eat and feed to their families. We have all become guinea pigs in a highly controversial and dangerous experiment.

International agro-chemical companies adamantly oppose the labelling of GE foods, on the grounds that this will scare off people from buying them. At the very least, genetically engineered foods must be labelled so that we can choose for ourselves whether we will eat them or not. It is urgent that laws be approved in order to mandate the clear and accurate labelling of all foods derived from, processed with, containing or consisting of genetically engineered organisms before they are released into any and all commercial markets. Labelling must be clear, visible and understandable to all. In addition, many people suffer from various kinds of allergies caused by the food they eat; accordingly, all products should be labelled with information that allows allergy-sufferers to make a safe choice.

Only the experience of extensive laboratory experiments and carefully controlled field trials over a long period of time will provide any realistic basis for a broad claim of the safety of GE food. A precautionary 'safety-proven' policy cannot be sacrificed in favour of corporate financial interests. "The bottom line" says American toxicologist Susanne Wuerthele "is that we are confronted by the most powerful technology the world has ever known, and it is being rapidly deployed with almost no thought whatsoever to its consequences."

The five-year moratorium is needed precisely to enable this thought to take place. Responsible experimentation during such a period would at least allow us to assess more accurately the effects of GE on consumers, farmers and the environment itself.

**7. Signs of Hope**

In 1996 in Germany the physicians' association issued a statement demanding the labelling of GE foods. Germany has banned Novartis Bt maize. The initiative "No GE on communal land" of BUND (Friends of the Earth, Germany) is active in several German communities, promoting discussion and voting on 'GE-free' resolutions. Several Protestant Church organisations have banned GE crops from their land.

In Austria in 1997 the Government stated that it wanted to be a "Biotech-Free Zone". Austria has banned three varieties of GE maize.

In Norway an Act was passed prohibiting the release of genetically modified corn, tobacco, chicory and rape-seed, stating that anti-biotic resistance was already a serious enough problem without adding anti-biotic resistant genes into the food supply. Norway has imposed a ban on the import of six GE crops and products that contain anti-biotic resistance. Thirty-one applications have been rejected to date.

In England, Iceland Frozen Foods, the fourth largest retailer in the country and largest manufacturer of England's frozen food supply, announced in 1998 that its in-house product line would be made without GE ingredients, and all its other products would be labelled. The Church of England has refused permission for GE crop trials on 60 000 hectares of its land. Dozens of local authorities supply GE-free school lunches and the House of Commons has banned GE food from its catering.
In Italy there are bans on GE crops in four regions and twenty-five provinces.
In Japan in 1997 the leading food retailer initiated plans to label GE foods in its stores.
Members of the Japanese dairy industry decided not to import cheeses that contained Chymosin, the genetically engineered cheese enzyme, stating that Japanese consumers were not ready for genetic engineering.
Denmark will spend five hundred million US dollars over ten years in a programme aimed at the creation of 100% organic agriculture.
Since December 2000, Algeria has banned the import, distribution, commercialisation and utilisation of GE plant material.
Egypt has decided not to import GE wheat.
Saudi Arabia has banned GE food and will not import GE wheat.
Sri Lanka has banned the import of all GE foods from May 2001.
The Chinese Government banned the commercial planting of GE rice, wheat, corn and soybeans.
Australia has banned GE rape-seed in Tasmania, and has banned commercial planting of GE crops in Western Australia (Australian States have been given the right to declare themselves GE-free). In New Zealand the Government has blocked trials of GE salmon. Some local bodies in Wellington and Auckland have declared themselves GE-free.

**8. The South African Situation**

The present South African legislation, Act 15 of 1997 (GMO Act), is internationally recognized as being completely inadequate to control GE applied to agriculture and food production. The GMO Act and the Regulations of the GMO Act issued by the Department of Agriculture in 1999, do not offer any protection for farmers or consumers with respect to negative livelihood, environmental or health consequences. The current legislation also provides exemptions from permitting requirements for almost all genetically modified seed, food or animal feed. Academic and research facilities too are exempt from permits.
Furthermore, in the GMO Act there is a total absence of the "polluter pays" principle embodied in National Environmental Management Act (NEMA, 1998). Up to now South Africa has not yet signed the Bio-safety Protocol (1999) providing for strict bio-safety liability when moving GM organisms and material internationally.
In view of these widespread concerns, and given our lack of knowledge about the long-term effects of GE, the following questions arise for South Africans:

- What signs of hope have we in South Africa?
- Could the Government share with the nation the steps that have already been implemented to eliminate the negative effects of this new technology on health and environment?
- What measures have been enforced to label accurately local and imported foodstuffs?
- What percentage of National Budget is allocated annually to:

- promote organic agriculture
- protect our biodiversity
- promote and protect traditional farming systems

We appeal to our Government to take seriously the plea of the Southern African Catholic Bishops Conference (cf. November 2000 statement) who are calling for a moratorium on GE crops and foods, in support of the campaign launched by the South African Freeze Alliance on Genetic Engineering (SAFeAGE).

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