French Collective for a Citizens' Conference on GMOs
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GMOs:
civil society argues its refusal

The case for a public debate

Summary

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INTRODUCTION

58 million hectares of transgenic plants cultivated in the world in 2002, that is 4% of the planet's arable land (or a little more than the surface area of France). It's both little and a lot. Little if, as the promoters of these crops are telling us, GMOs are to protect the planet's environment and feed the world. A lot if, as worries a vast majority of the world's citizens, GMOs (plants, and soon animals), radically-new fabrications, can become the source of environmental, health and socio-economic disturbances.

It is in order to reflect these concerns that several French NGOs, associations and syndicates[1], grouped together within the ccc-OGM collective[2], have decided to draft together a *"dossier of charges"* against GMOs. This dossier is the result of collective work toward which writers[3] from all horizons of civil society have contributed, tacking the GMO issue with its multiple dimensions – scientific, legal, economic and ethical. For each theme, we have given priority to an analytical approach: this dossier of charges is structured, with the supporting scientific references, around an appraisal of the debate and an analysis of the issues and proposals involved.

Over and above the diffusion of information, the objective of this dossier is to demand that the French government hold a public debate. Pending publication of the dossier in its fullest form (early 2004 for the French version), the collective wanted to publish a synthesized version[4], most importantly in order for it to contribute to debate during the European Social Forum of November 2003 in Saint-Denis (an English-language version will be made available at this time).

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2, French Collective for a Citizens' Conference on GMOs

3, See the list on page 3.

4, In order to lighten this summary, the bibliographic references (more than a hundred) have not been cited. They can be found in the complete dossier awaiting publication, and which will also include a detailed glossary.

Overall coordination of this dossier has been managed by Frédéric Prat[5] from GEYSER. General secretaryship by Eric Meunier, from the Inf'OGM association. A large part of this work was financed by the Charles Léopold Mayer Foundation for the Progress of Humanity[6]. Our thanks go out to them.

F. Prat

Note : the opinions expressed in this collective publication have been subject to multiple rereadings but remain the responsibility of the authors of each chapter, and only engage themselves, with the exception of the conclusion which expresses a joint position common to the collective as a whole.

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To keep up with current news on GMOs, you can take out a subscription for the Inf'OGM monthly French-language report, at 15 euros/year for 11 issues.
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Chapter 1
SCIENTIFIC PARADIGMS[8]

Since the 1970s, genetic engineering has allowed us to modify the hereditary information support and transfer DNA segments from one organism to another, from different species or kingdoms, otherwise impossible through sexual reproduction. Although continuing in the line of laboratory techniques, genetic engineering, through its industrial applications, appears as an unprecedented rupture, not only in the history of biotechnologies, but also in its social, economic and ecological consequences. However, the more we question the practices and concepts of molecular biologists, which form the basis of *"scientifically-founded"* arguments to justify releasing GMOs into the environment, the clearer it becomes that the very foundations of these modifications are uncertain.

Laboratory efficiency and technical controls

Plant transgenesis applied to the selection of new varieties has been presented as a *"much better-controlled process for obtaining new varieties than selection after crossing parental species, allowing us to assert that this process is not itself intrinsically dangerous"*. Far from being without consequences on the evaluation of risk and voluntary dissemination of transgenic plants, these assertions, issued by the GMO experimentation and marketing authorisation body, should today be seriously revised. In fact:

- It is not only the gene of interest that is transferred but also a completely artificial, chimeric structure, reassembling genetic elements issued from very diverse organisms (virus promoters, bacteria-marker genes…), and the consequences of this structure must be correctly evaluated.
- Over and above the source gene (that of the donor organism), expression of the gene of interest can be limited, even totally inhibited.
- Multiple interactions happen between the gene inserted and other genes, bringing about effects that it is impossible to predict or control.
- The transgene contains a DNA segment extracted from a virus that interferes with the gene control mechanisms in the recipient organism.
- Successful integration of chimeric DNA into the genome of a foreign organism being an extremely rare event, despite all the tricks employed, it therefore becomes necessary to add a marker gene allowing easy selection of cells that have integrated the transgene. Whatever the tech-

8, Principal author: R.A. Brac de la Perrière, brac@bede-asso.org

nique used, insertion into the genome of the recipient organism happens largely by chance, which may activate or subdue certain functions unable to be detected by substance equivalence analysis.
- Once disseminated in a natural environment, transgenic varieties have every chance of crossing naturally with other varieties and with spontaneous forms of the species' complex, causing irreparable disturbance. Thus, recent results on contamination of local maize varieties in Mexico, at the heart of the species' original centre of domestication, demonstrate transgene-fragment dispersion at different genome levels in contaminated varieties.
So, a "*much-better controlled process*", *"not itself intrinsically dangerous"* ?

Questioning scientific concepts of the gene

Today, part of the scientific community that has not integrated the molecular biology revolution and the vast majority of laypeople secretly retain a linear representation of genetic determinism (a gene, a protein, a function). However, new molecular tools that should have served to reinforce the paradigm of the genetic programme through DNA sequencing have paradoxically produced results tending to replace it. For twenty years now a more complex model has thus been developing, based on notions of interactions, of reciprocal effects between genetics and epigenetics, the importance of which is steadily being discovered.

While the conceptual scientific basis upon which the technique of transgenesis is founded appears to be brought into question, the importance of the discourse on genes is becoming more and more obvious. For the specialists, this discourse *"without doubt represents a far greater handicap for laypeople's understanding, misinforming them as much as informing them"*.

Reductionism and the scope of scientific truth in molecular biology

The fact that experiments scientifically validate a certain amount of knowledge is not enough to justify using this knowledge to do something. The desire shown by experimental biology practice for several centuries to master nature can no longer have the same meaning since the advent of modern biotechnological techniques, in that these techniques are henceforth sufficiently effective to allow this mastery to be realised, inducing profound changes that man will be unable to keep under control. The major act that allows a scientific approach to nature is simplistic modelling. The multiplicity of the different branches of knowledge involved together with the assimilation of that knowledge to know-how creates a reductionist spiral that tends to results in the identification of an object that is natural, complex and impenetrable, progressively simpler and more artificial. Genes are thus talked about as simple, interchangeable

mechanical parts, without understanding their functional reality. A plant is reduced to the characteristics that are explicitly part of the researcher's project, without comprehending its other vital features. Is this reductionist approach not paradoxical, given that a transgenic plant, like any living organism, lives in relation to other living organisms, and that its condition depends on the condition of these other living organisms and on the types of relationships it has with them? Yet no study method for these extraordinarily complex systems has ever been developed. At the present time we have absolutely no means of evaluating the systemic effects induced by such and such structural modification, or the consequences – in terms of the evolution of living organisms – brought about by repeated, routine transgression of the barriers between species in numerous laboratories. Furthermore, the large-scale cultivation of a few transgenic varieties over millions of hectares has never yet been seriously assessed, and nor can it be, given the current lack of suitable technology.

Technology too far ahead of science

The scientific paradigms justifying transgenesis and the development of GMOs need to be profoundly reappraised. Conceptual tools for plant selection do not sufficiently question the transgenesis technique from which, on two points at least, the consequences in terms of risk can easily be drawn. On point is that transgenesis should be considered as a factor of **reproductive barrier porosity** in the species complex of cultivated plants. The progressive role of this compartmentalisation, tried and tested over long periods of time, suddenly becomes subjected to unpredictable ruptures. Another point is that **genome disturbance by unstable chimeric insertions**, introduced via natural hybridisation between local varieties and transgenic varieties, appear to warn of profound upheavals for peasant farming's complex agrarian systems.

However, as the premise upon which GMO technology is based is fragile, tending to be invalidated by more recent genome research, there are obvious repercussions on our ability to manage the dissemination of these organisms in the environment. Gene transfer is issued from technology that is decades ahead of scientific knowledge, and as a result chimaeras are created in a complete absence of predictability as to their behaviour and their fate. The particular instability of transgenic lines over time has already been confirmed by numerous examples. Scientific knowledge continues to grow richer, further invalidating the reductionist vision that justifies gene transfer. Thus, combine the complexity of gene ecology with additional modulation by environmental parameters and it quickly becomes clear that chimaeras manufactured in a laboratory and viable under those very restrictive conditions will not necessarily function, or function but in unexpected ways, in dissemination environments of infinite variety.

The consequences of this 'looseness' on scientific knowledge will result in a difficulty in setting up *"scientifically-founded"* GMO regulation tools. The genetic database that is to allow traceability and labelling cannot be finalised because experimental GMOs are not declared. And, as commercial GMOs show genetic drift in their transgenes, casting doubt on the reliability of detection techniques and methods, the current approval files and their tests are no reflection of reality and must be redesigned.

Chapter 2
IMPACTS OF GMOs ON THE ENVIRONMENT AND ON HEALTH[9]

When considering promoting the products of new technologies, the rule to be respected by head administrators and decision-makers should be to assess the equation between risks and benefits, most importantly if significant health and socio-economic implications are involved: what follows is the principal of safe practice.

The situation concerning GMOs is in fact very simple, caricatural even. Keen to get a return on their investment, the biotechnology companies did not take the time – and, above all, the authorities did not oblige them to – to study in depth the impact of GMOs on the environment and on health. These two elements are intimately connected : often, when man attacks his environment, he attacks himself also.

Have the innovations resulting from biotechnology not been far too quickly subject to business concerns? Are they not trivialised due to a reductionist and mechanical conception of living organisms that treats the genome like Lego (see chapter 1) and life like a succession of physicochemical reactions?

Only GMOs designed for agriculture raise public concern, but nevertheless it must not be forgotten that GMOs designed for therapeutic use follow the same logic: while they may raise hope, that should not facilitate the amalgam between two distinct domains, even though the two fields can merge when plants genetically manipulated to produce molecules for therapeutic use contaminate food plants, obliging them to be destroyed before harvest, as has already happened in the USA.

Proven environmental risks

As far as agricultural GMOs are concerned, in the absence of adequate impact studies, nature is becoming a field of experimentation when certain environmental risks are irreversible. Such has been the case with the spreading of transgenes by pollens – which has been proven large-scale in the USA and Canada – causing important economic damage to the productions thus contaminated. Significantly, insurance companies refuse to cover the risks associated with GMOs for the simple reason that these risks have not been evaluated.

However, more than 95% of experimental cultivation led in France is aimed at studying the agronomic advantages of GMOs and to cross them with commercial varieties, and

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not at studying their impact on the environment or on health. Public opinion is therefore misled on the experimental nature of these crops, the objective of which is to verify their economic potential before market launch.

Over and above dissemination, the major foreseeable environmental risks are a reduction in biodiversity, predator adaptation to toxins from the transgenes, a worsening in pesticide pollution contrary to the claims of GMO promoters, reactions from earth-embedded micro-organisms on contact with the roots of transgenic plants, unexpected toxic effects on the environment… and on health: this risk results from interference brought to interactions between genes by genetic manipulations.

Little is known of the regulatory mechanisms of living organisms. Before commercialising GMOs, basic research must be given the time and resources necessary to better understand these mechanisms, and to deepen our knowledge rather than take the risk of opening a Pandora's box: this observation alone should be enough to force a moratorium based on scientific reasons, especially when basic research shows transgenesis as a process that forces the life process.

Probable health risks

Food health safety is already called into question by the fact that it has authorised the import of transgenic grain fodder consumed in large quantities for farming (maize and especially soybean). In fact, these plants themselves either secrete an insecticide and/or tolerate a herbicide, that is, they are able to store greater concentrations without dying by accumulating the product's metabolites and adjuvants. What happens to the pesticides concentrated in the products that come from the animals consuming them (such as meat and dairy products)? What impact on the consumer? Without traceability, no specific health monitoring is possible. Other foreseeable health risks are the risks of infection due to transgenes coding resistances to antibiotics commonly used in medicine (ampicilline, kanamycin), and due to the potential appearance of new bacterial germs based on viral recombination facilitated by GMOs, but also risks associated with the deliberate crossing of the species barrier and the inter-kingdom barrier: the creation of allergenic foods, of neotoxins via the interaction of transgenes on neighbouring genes in the plant genome with unexpected effects, particularly on immunity, observed in the laboratory.

On the other hand, as far as the advantages of GMOs are concerned, nothing has yet been proved: this is the major message from the impressive international conference organised in December 2001 by the AFFSA on the eventual health benefits of GMOs.

When it's a question of a sense… of responsibility

What meaning do these genetic manipulations have when the citizen (or the farmer, the consumer, or even the politician) has not been able to give his opinion before these experimental products have forced themselves onto the market? The answer lies with the companies whose aim is to increase their monopoly on captive markets thanks to the patenting of species' genomes (see chapter 3) when these should be considered as inalienable because belonging to the common heritage of humanity.

GMOs designed for agriculture are, at the present time, experimental products: is it normal under these circumstances that we can find them in fields and on plates that are not, a priori, laboratory sites?

We cannot too strongly recommend that the moratorium on transgenic culture be reinforced and that the importation of transgenic plants intended for animal feeding be suspended, pending product-labelling based on genuine traceability, which would imply, for animal-derived products, indicating the type of food (only the "AB" - Agriculture Biologique - label for organic products can guarantee such traceability), especially if the food contains GMOs - although the recent European Parliament vote on product-labelling still does not take this into account – and, as a result, an eventual lifting of the moratorium could only be justified on the grounds that the consumer would be better informed.

Furthermore, the European moratorium on GMOs cannot be lifted as long as regulations have not been laid down concerning responsibility and compensation for losses incurred by producers whose product specificity has been altered by transgene-carrying pollen contamination, or by manipulations at some point along the chain.

The responsibility is thus with European deputies and national representatives towards both the preservation of food resources and health safety: both ours and those of generations to come.

Chapter 3
GMO PATENTS AND THE PRIVATISATION OF LIFE FORMS[10]

In July 1998, the European Parliament adopted the Directive on the legal protection of biotechnological inventions (Dir. 98-44) which sanctions a movement begun in the USA in 1980 to broaden patents to cover *"biological material"* containing genetic information that is *"autoreproducible or reproducible in a biological system"* (Article 2-1a). The European regulations in force today thus state that *"inventions eligible for patenting must be new inventions, involve an inventive step, and be capable of industrial application, even when they apply to a product composed of or containing biological material, or to a process allowing the production, treatment or use of biological material. Biological material separated from its natural environment or produced using technological know-how can be an invention, even when it already exists in natural state"* (Article 3). All marketed GMOs are patent-protected. Through the granting of industrial property rights to biotechnology-related techniques, all modified living organisms, their components and their descendants can be privatised.

Absence of democratic decision

State representatives for international conferences on intellectual property rights are not elected but are civil servants, representatives of intellectual property rights institutes. The patentability of microbiological techniques and the products thereby created was decided at the Strasburg Convention in 1963. This has brought about a veritable revolution, promoted by the *"patent community"*, and so has not been subject to the least discussion between experts from different legal fields nor from various social and economic groups, and public debate still less. Furthermore, the patent offices system is nothing of an independent body: it is a commercial enterprise that is financed itself, that is by the clients who register their inventions, and thus by industry.

The expansion of claims is an obstacle to competition

Patent legislation was not created to be applied to biological organisms but to machines. The constant pressure from the biotechnology industry has led to jurists finding "new

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tricks" to broaden claims, already virtually limitless given the uniqueness of natural world. Thus, little by little a perverse patent-dependent mechanism is establishing itself that allows a company with the financial capacity to build itself a solid patent portfolio to appropriate in advance patents concerning the same organisms, or to effectively block all research or application of any invention in a given sector, such as food or health. The Myriad Genetics example illustrates how the use of patents for a genetic sequence allowed the company to demand royalties that prevented medical practitioners and clinical laboratories from carrying out genetic tests on proneness to breast cancer, thus restricting access to healthcare, compromising healthcare quality and senselessly increasing costs.

Public research pledged to private industry interests and practice

Public research teams are finding it harder and harder to put their particularity, which was producing knowledge for public benefit, to good use, since they are now being asked to conduct research, even basic research, for the benefit of industrial applications. More or less obliged to work under contract for the private sector to finance their running costs, they have to respect secrecy strategies throughout their research and conduct premature patenting so that their inventions might have a chance of interesting an industrial client, and thus be developed one day. Under these circumstances, they are finding it harder and harder to direct their research towards sectors that do not interest the chemical and pharmaceutical industries, such as organic agriculture, or even to conduct independent research programmes in the field of biotechnologies dependent on product licences and patented techniques.

The patent on living organisms leads to a more and more dangerous artificialisation of the world

The patenting of biotechnology products and techniques is the driving force behind GMOs and consequently the artificialisation of the world. Between producing a variety by classical selection techniques and producing a variety by transgenesis, the company will choose the GMO because it will have the right to protect it by a patent. Despite the incertitude and risks concerning health and the environment, GMOs are forced on consumers the world over, to the detriment of conventional supply chains.

The privatisation of genetic resources offers the possibility of monopolising the natural world.

Patent rights are filed by laboratories on plant, micro-organism or animal samples taken in the natural world or in farmers' fields. A handful of multinational companies from the chemical and pharmaceutical industries today control the vast majority of biotechnological research applications, including practically 100% of the marketing of transgenic seeds (see chapter 4). Their strategy for market control is founded on the size of their biotechnology patent portfolio. The patent system applied to genetic resources allows companies who invest massively in biotechnological research into plant selection to first pirate the genetic resources of countries too poor to defend their rights and those of the communities that maintain these resources, and second to "close the species" to other research by privatising the genetic heritage surrounding the patent when it cannot be used separately for future improvements.

The expropriation of farmers' rights to seeds threatens both biodiversity and their very survival

Since the dawn of time, farmers have conserved a part of the seeds they have produced to plant them the following season, whether they be traditional varieties or recently-produced plant varieties. This domestico-agricultural method of production founded on the existence of a peasant class is today threatened by the generalisation of F1 hybrid varieties and by the demands of partisans of the patent for plant varieties for the withdrawal of farmers' "privilege" to be able to resow a protected commercial variety. Over and above the economic aspect, local-seed multiplication and selection practices serve to maintain a varietal diversity adapted to a wide range of soils, which is the only way we can hope to maintain productive agricultural activity where industrial agriculture from various green revolutions has failed, and contribute to the preservation of biodiversity.

The iniquitous role of international agreements

In order to ensure the profitability of their investment and a flow of revenue on their "inventions", multinational companies want the application of intellectual property rights to be spread to the whole planet. The industrialised countries, therefore, used the GATT [General Agreement on Tariffs and Trade, now the WTO (World Trade Organisation)] negotiations to impose the implementation of an international agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). In the agreement, countries become obliged to recognize the patent on micro-organisms and to dote themselves with an intellectual property rights pro-

tection system for plant varieties. While revision of the WTO intellectual property agreement (Article 27.3b) is under negotiation, another front is being opened at the World Intellectual Property Organisation (WIPO) in order to generalise the patent worldwide.

Revise the patent rights for living organisms

For a long time, the supplanting of this debate encouraged loose interpretations that have slowly officialised the patenting of life forms. However, ethical questions have to be raised when biological material is thus reduced to its chemical constituents. There is in fact a genuine moral perversion when seeds, plants, animals or human cells are reduced to the level of simple 'inventions', to make us believe that these living organisms are only products of the mind created by researchers.

The ethical question cannot be ignored, and is posed within patent law. However, the *"patent community"* cannot be left to reflect upon and decide this question by itself when society as a whole is concerned. What is needed is for any extension whatsoever of intellectual property protection to life-form technologies to depend on an international court that is independent of the patent community, and for patent bureaus to be independent of industry financing. The patent system that has been developed to protect inanimate innovations is a legislative tool that is inappropriate for living organisms and their constituents, and must be re-examined by a very large community of representatives from different cultures and sectors of society. For the European Union, a repeal of the Directive on the legal protection of biotechnological inventions (98-44) could be a first objective. The second objective could be to support the positions of countries who have already declared a strong ethical position against patenting living organisms and natural processes, as is the case of the African group at the WTO, and the positions of countries who are trying to impose obligatory licenses, particularly in the field of medicine.

Chapter 4
ECONOMY AND TRADE: GMOs, THE OUTCOME OF LIBERAL REASONING[11]

As with other sectors of the economy, agriculture is also the seat of a large concentration of capital, particularly in the domain of seed: GMOs, in fact, are only yet another tool for obtaining this concentration.

GMOs, a tool?

In order to control the seed world, seed companies have had to "invent" hybrids, then GMOs, and finally Terminator-type techniques (currently in cardboard boxes, ready and waiting). Scientists working on living organisms thus find themselves in an awkward position, difficult to get out of. They are caught between their legitimate capacity as researchers, public-sector authorities decreasing their budgets, the financial sector's entry into public-sector laboratories, and the necessity for financers to witness a rapid return on their investment. At the same time that seed companies are inviting themselves into public-sector research on living organisms, with the tacit help of the authorities, so as to take advantage of any technological advances that seem potentially profitable for them, they are organising their legal protection against the possible or probable impacts GMOs may have on health and the environment, not only by creating contracts that in reality equate to extortion, but also by setting up legal barriers that will prevent them from attack in case of a health disaster.

The WTO, a GMO tool ?

This concentration of capital also causes a significant effect inherent to the prevailing major economic system: impoverishment of supply and a loss of biological diversity. These are everyday features of all industrialised capitalist sectors that follow from the technological rationalisation of each supply chain.

Supermarket retailing has recognised all the economic advantages that such concentration can bring about. In order to maintain or increase their profit margins, the supermarket retailing sector pragmatically invests in large-scale agricultural production on one hand so as to

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obtain foodstuffs (or transformed products) at low cost, which has consequences on the concentration of cultivated areas in the hands of a progressively diminishing number of farmers, and on the other hand also invests in the "bio-industrial" chain, without taking ethics inherent to the sector into account, and this in order to reply to customer demand.

So it is easy to observe how WTO rules follow and organise the entire industrial chain of agriculture, on a worldwide scale, leaving aside a progressively greater mass of small farmers.

The WTO is setting up a worldwide agricultural policy to serve a handful of companies who thereby obtain all the elements they need to be able to control the living organisms sector.

Chapter 5
COMMUNICATION STRATEGIES OF BIOTECHNOLOGY FIRMS[12]

Communication on GMOs is a major element in biotechnology companies' strategy against the rejection of this kind of product observed by a majority of citizens, consumers or farmers. Therefore, the biotechnology companies attempt to create a positive image for GMOs by associating their development with the expected benefits for the future of our societies. GMO promoters use biased terminology and images to support their arguments. This chapter studies the GMO-promoters' communication strategy mechanisms via analysis of their sales talk, and exposes their limits and contradictions.

Between dreams and lies

Faced with citizens' reticence or even hostility towards GMOs, this communication works along a major central theme: changing the negative conception consumers have of them. GMOs are presented as the only solution to our societal problems (world hunger, pesticide pollution, transformation into biofuel to fight climatic change…), but the discourse only skims through or even eludes alternatives for research or that already exist. Aware that commercial GMOs fall short of consumer concerns, the biotechnology companies run communication on the virtues of GMOs to come, second or third generation products, in order to make the GMOs that are currently marketed palatable.

And in order to establish them within a rationale of societal development, GMOs, which are products derived from human technology, become, in the language of their promoters, natural products. Continuing the plant improvement process initiated by the first farmers, GMOs legitimately become the source of "progress" and the future of Science. To slow down or stop this progress would consequently be tantamount to immoral behaviour on the part of citizens, who are qualified as obscurantist when they mow down transgenic plants. Yet all the surveys show that the more people are informed on this theme, and/or the higher their level of study, the more they are critical of GMOs. Through these acts of civil disobedience, the last resort for mobilising public opinion, these citizens are calling out to the government: they are refusing to let a technology be imposed on them without democratic debate, and demanding that public debate be held.

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Chapter 6
GMOs AND RESPONSABILITY[13]

Faced with increasing risks of contamination and the trials in perspective between farmers who cultivate GMOs and those who do not, the question of responsibility and compensation for damages related to GMOs is a burning issue. If the suspected risks turned out be founded, who among the various actors intervening in the production and marketing of GMOs would be deemed responsible for damages? Who should secure compensation for damages ? Who would be responsible for taking the necessary precautionary measures? It is difficult to give precise answers to these questions at the present time.

Who will be responsible?

The laws on responsibility in the event of damages related to GMOs is still in the very earliest stages of development. The options are as follows:
- Wait for environmental, health or economic damages related to GMOs to occur and leave national tribunals to look after the jurisprudence, using general instruments of law (administrative, civil and penal);
- Integrate the GMO risk into environmental legislation on responsibility, which is the approach adopted at European level;
- Create specific rules on GMO-related responsibility and compensation: the particular characteristics of the risks incurred plead for this kind of proactive approach. The initiative undertaken at international level within the framework of the Carthagena Protocol on Biosafety shows that the international community deems it politically necessary to establish specific rules on responsibility and compensation in the event of damages related to GMOs.

Without prejudicing the last option which could be chosen at national, European and international levels, it is urgent that we define the obligations of actors who introduce the GMO risk – GMO producers and users. These obligations, which are heavy with political implications, should at least be founded on the polluters pay principle and the principle of safety first.

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Chapter 7
GMOs: THE END OF HUNGER ?[14]

Might not GMOs be a solution to the problem of hunger in the world ? This is in any case one of the principal arguments put forward by GMO promoters. Does this argument contain a certain amount of hidden truth, or are there not other reasons that draw on a form of bad conscience industrialised countries have regarding the so-called developing countries? Why would biotechnologies be able to feed the world when questions concerning famine and malnutrition, priorities for global development, have remained practically unanswered since being asked at the United Nations?

The immoral European Union

Our hypothesis is that a link established as such between GMOs and the end of hunger would not only feed good conscience for the western world, but also the economic interests of the developed countries: the recent polemic on American food aid for African countries (eventually refused by the government of Zambia) is one example. There was no lack of resorting to moral arguments, with the United States accusing Europe of creating an "immoral" position by encouraging certain African countries to refuse the food aid insofar as refusing this aid threatened certain populations with death. This moral debate, however, masks important economic issues : in fact, the American maize and soybean export market is waning under the conjugated effects of both the European moratorium and transgenic-seed import restrictions by Asian countries such as China and Japan. In this new economic wrestling match, the United States hesitated for several months in early 2003 before bringing the affair before the WTO, as they feared fuelling European reactions, even if they won. The complaint was finally filed in May 2003.

An ambitious objective was set in 1996 at the first UN World Food Summit: to halve the number of starving people in the world by 2015. In June 2002, the UN General Secretary Kofi Annan nevertheless reminded world leaders that there were 800 million starving people in the world and that in 2015 three-quarters of them would be African.

In this economic battle between the "big players", a small group of African scientists, having initiated research projects on transgenic foods are affirming that biotechnology already presents interesting results for developing countries, but which can only break through if they

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can get the financial and logistic means they need to be able to bring their research to a successful conclusion, a position not unanimously supported by the African scientific community. For other African figures, rather than investing funds in the technological development of agriculture in Africa, work ought to be done on changing modes of government so that populations can learn to better manage their resources.

Rich-country technology

As a counterpoint to the scientific and politico-economic debate, the FAO has been expressing a necessarily ambivalent point of view, emphasising GMO potential for the development of resistant plants in specific environment of tropical cultures, but point out that it is necessary to be vigilant concerning the impact of GMOs on biodiversity, warning against the risks of reinforcing economic domination. The 1999 FAO report underlined that *"biotechnology is generally more costly than more classical research, and its use should be reserved to specific needs for which they represent a comparative advantage"*. The FAO member states have already expressed worry about the gulf between developed and "developing" countries concerning their ability to be able to use biotechnology. Since then, despite all the warnings, promises and efforts made, biotechnologies have contributed nothing towards alleviating hunger in the world. In a press statement giving an account of her Rome communication of February 18th, 2003, Louise Fresco denounces the north/south molecular divide, maintaining that the divide between rich and poor countries in the mastery of biotechnology has in fact widened.

The FAO's position on this point, reiterated for at least the last five years, is clear and final, undermining the effects of biotechnology companies' promotional announcements and their lobbying organisations on new-generation GMOs enabling the fight against hunger in the world.

The recurrent announcement of new transgenic plants enabling the fight against hunger and malnutrition, such as vitamin A-enriched "golden rice", needs regular review to check for veritable advances; it then becomes clear that it is more a question of announcement effect than any real impact in the fight. Golden rice has not yet left the laboratory and here is the IRRI announcing the development of new varieties of transgenic rice able to satisfy the requirements of developing countries: *"Dream Rice"* (a dream of more nutritive rice) and *"Aerobic Rice"* (needing less water).

Are not these dream foods running the risk of becoming the mirage of biotechnological development for years to come, masking the social and economic conditions that, in reality, govern the problem of hunger in the world? For one new variety of transgenic rice, how

many hundreds of traditional varieties will have disappeared under the effects of the *"green revolution"*, as is the case in India where some varieties possessed elements of resistance to environmental stresses?

Farmers of the world: integration or exclusion?

If the moral argument for food aid is advanced largely for the promotion of GMOs, the biotechnology companies have nevertheless not forgotten to also put forward the economic arguments.

From a strictly macro-economical point of view, the major argument is the continued worldwide growth GM crop areas. According to the ISAAA (International Service for the Acquisition of Agro-biotech Applications), which enjoys a virtual monopoly on the production of statistics on the evolution of transgenic cultures worldwide, the latest figures for 2002 show that a quarter of genetically-modified crop areas in the world will be exploited by developing world farmers, with few resources at their disposal. These are often Bt cotton crops, as is the case in India.

But if the ISAAA has taken upon itself the mission of helping developing countries to access biotechnologies, it is doubtless more out of an interest in conquering markets and territories than philanthropy. The reasoning the underlies the importance of this data from the point of view of the fight against hunger in the world is that Bt cotton gives a higher yield than non-GM cotton, thus leading to an increase in income from smaller-scale farmers. Admittedly, the fight against poverty is the best way to fight against hunger in the world, giving families the possibility of acceding to local food markets. However, the question of figures on the increase in yields remains confused and does not allow a real mid-term evaluation of a veritable reduction in the poverty of the majority of farmers in developing countries, especially the Indians.

So, over and above any debate on the improvement in yields, the real economic impact on the average revenue of farmers in developing countries and the effect on the decrease in poverty-related malnutrition problems for these populations therefore remains to be confirmed. In other words, the emergence of a population of integrated farmers will without doubt be offset by the elimination and impoverishment of an increasing number of small farmers who will rejoin the already swollen ranks of those excluded, thereby risking causing the opposite of what the companies are promising.

Chapter 8
IMPACTS OF GMOs ON AGRARIAN SYSTEMS
OTHER AGRARIAN SYSTEMS ARE POSSIBLE[15]

Large-scale GM crops seem to yield results, albeit contested results, exclusively in agro-extensive systems. Above all, they allow work to be simplified and promote monoculture together with the continuing industrialisation of agriculture. This aim, advocated by certain agri-managers, does not at all comply with the direction society would like taken, namely an agriculture more and more in phase with the concept of durability. In fact, these "advantages" are accompanied by numerous agronomic, environmental, social and legal impacts. These impacts, which have not yet been studied in detail, are nevertheless easy to identify and quantify : contamination of organic and conventional crop and seed plots, an increase in resistance to weed-killers, growing quantities of herbicides and insecticides spread and disseminated, yields not often as high as expected , a technically-impossible airtightness between, on the one hand, organic and conventional crops and, on the other, transgenic crops, therefore an illusory coexistence. That is without counting other consequences widely supposed but not yet established, as complete research protocols have not yet been established concerning the increase in predator resistance, the long-term impacts of a continuous transgenic diet for animals or of the toxicity of genes introduced into plants, or the effects they bring about, as much for human health as for ecosystems.

Is agriculture condemned to an all-transgenic?

While seeded areas are increasing regularly every year, they remain confined to a few large countries axed towards the export of foodstuffs, countries like the United States, Canada, Argentina or, to a lesser extent, China and South Africa. On the other hand, alternative production systems to GMOs do exist. They are widely distributed and spread across all continents. These systems have absolutely no need for GM crops to be able to give more global performances, introducing a factor of capital importance, namely agrosystem reproducibility (eco-

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16, According to a study revealed by Greenpeace and Friends of the Earth: GMOs in Spain do not hold their promises. Spain is actually the only country in the European Union that annually grows 25,00 hectares of commercial transgenic maize modified to resist to the European corn borer (Bt176 maize produced by the Swiss company Syngenta). A study by the Official Navarre Institute of Agronomical Research carried out between 1998 and 2000 shows that in most cases there is no difference between transgenic and conventional crops in the event of an attack by European corn borers.

logical reproducibility, integration of environmental and social costs). One programme in Brazil invites farmers to network themselves in order to promote alternative selection forms, such as local seeds, so as to replace the generalisation of hybrid and/or GM maize, too unsuitable and costly in terms of production costs. In Kenya, integrated crops are promoted in order to save maize crops from the Striga parasitic plant (*Striga hermonthica*) and from borer insects. In India, Tanzania and Egypt, non-GM cotton crops, produced with respect to agrobiology and/or biodynamic culture specifications, have no higher production costs if care is taken to include the overall social and environmental costs and impacts.

The imposing of GMOs is in no way related to comparative economic advantages, but is founded on financial benefits that logically flow from the policies advocated by the majority of green revolutions throughout the 1970s, that is: giving priority to technicity, mechanisation, dependence on production costs and on certain cultural practices industrialised around a few cultivated plants, forbidding farmers from replanting harvested seeds. This voluntarily-organised restriction effectively encourages a loss in biodiversity, the disappearance of the variability of cultivated plants benefiting a handful of powerful seed-producing, phytosanitary and agri-food companies to the detriment of farming communities' practice and know-how.

Choosing autonomy

GMOs, unusable for the vast majority of the planet's farmers, could never feed the entire population of the world nor answer the problems of malnutrition and undernutrition. Other agrarian systems within the reach of small-scale farmers show that it is nevertheless possible to respond to this challenge, provided that they are given more autonomy, starting with access to land and to the production of seeds that are adapted to the diversity of that land and of agrarian systems. Scientific research can contribute greatly, provided it can escape the laboratories where it has hidden itself from patents and VOCs, and work with farmers to develop participative modes of selection. Similarly, a Europe-wide refusal of GMOs could allow scince to reach an acceptable level of autonomy in vegetable proteins lost after commercial agreements favouring protein importation, particularly GM soybean.

The type of seed determines the type of agriculture. The choice between an all-GM agriculture that would encourage the expansion of farms on mechanisable land and the disappearance of farming communities, or peasant farming organised around the production / employment / environment triptyque is not a technical or scientific choice but a purely political one. Between forced dependency and peoples' food autonomy, the choice has to be made today!

Chapter 9
GOVERNING RESEARCH AND TECHNICAL INNOVATION[17]

How can one understand the bitterness of the controversy over genetically-modified plants, the intensity of the principles evoked – progress, science, public research, the duty of precaution, freedom of research – without considering that it is a question of the crystallisation of a wider problem, the governing of research and technical innovation?

Research in 1945: a state affaire

Just after the Second World War, it became obvious that technology is a key factor in both military and economic power. The atomic bomb assured the victory of technology over the other traditional power factors: demography, aggressivity, fanaticism. As a source of power, research was given particular attention by the states who dominate the planet, with the "Cold War" announcing the technopowers era. State administrations, with nothing to stop them, were to forge the tools of research - universities, institutes, laboratories aimed at producing scientists, science - to be converted into power. From an economics point of view, the social function of this research was theorised. Research, the source of technical innovation, is the source of growth, itself the source of social stability, going on to form, along with money, one of the pillars of the world economy.

In the 1970s though, state power, undisputed following the war, ran out of steam in both blocs. As the effects of the Second World War progressively faded, private interests together with civic movements helped to erode its legitimacy and methods. The immense research capacity appeared to hang between two options, regulate itself through the market by passing alliances with industry, or democratise itself by opening up to civil movements.

Research in 1970: an economic affair

In the 1970-80s, it was clearly the first option that prevailed. Without the constitution of a worldwide civil society, states favoured the bringing research and economic competivity into synergy. This would lead to research capacity evolving in the general direction of economics: casualisation of basic research labour, commodification of research results, research

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efforts limited to only potentially profitable subjects. There was no lack of researchers to cooperate, often enthusiastically, in this great transformation. From regalian state to cartels, the governing of research has avoided democratisation.

This is the context in which genetically-modified plants were to be developed, co-promoted by laboratories, industries from the chemical sector and states looking for a new technological revolution liable to relaunch growth. However, the promoters enthusiastic about this technology met with an unexpected social resistance that was exceptional in its duration, its response across society as a whole, and the diversity of the themes it tackled. This resistance also revealed the existence within modern societies heavily influenced by science-based culture of a third-party research sector, an associative capacity for research and expertise that depended neither on the state nor on economics. The mass-training of scientists from the 1960s onwards supplied "civil society" with many executives capable of analysing, translating and contesting the major research programmes. Neither the state nor the economic sector held on to the monopoly on scientific information.

Faced with this front of refusal that expressed doubt as to the benefits of genetically-modified plants and wondered about the risks they run and the real interests behind them, the public authorities, in France particularly, were to follow an erratic line of conduct whose only permanent feature was to delay the democratisation of research and attempt to regain control of the debate.

Research in 2000: a public affair?

In several countries, the public authorities finished by recognizing that research did not enjoy a separate status and can legitimately be the object of debate. The question was how to deal with issues reputedly complex issues requiring the inclusion of notions of economics, ecology, cellular and molecular biology, ethics. Several initiatives came into being, particularly citizen conferences that, based on the jury model, combined information, reflection, debate and collective decision-making. This model, well-developed in Denmark, has been more or less faithfully reproduced in several countries.

Yet in a majority of states, and notably in France, a recognition of these new procedures would totally disrupt the established mechanisms of research co-management, and so the traditional bodies are opposing fierce resistance. No matter; henceforth the governing of research is faced with the challenge of democracy.

Conclusion
FOR A LARGE SCALE PUBLIC DEBATE

"Are you eating genes when you eat tomatoes?". No, replied a majority of European citizens a few years ago. And the GMO-promoters concluded: *"You see, they are against because they don't know anything!"*. Since then, all the surveys eloquently confirm that more exhaustive information on genetic manipulation reinforces citizens in their refusal of GMOs. The reasons for this refusal can therefore be found elsewhere than in a so-called "popular ignorance".

Science or technology?

The "living" is complex, and the objective of scientists has always been to understand and explain its workings. Recent decades have witnessed the emergence of a paradigm theorised and accepted by the majority of scientists: DNA, common element in all living beings, constitutes "the big book of life" and every gene or set of genes predetermines the development of an individual. Reducing this paradigm to its most practical basic truth, technicians empirically began "DIYing" genomes, not to understand their workings but to give new properties to living organisms. Science, though, for its part, continued its research, and as time went by this paradigm was called more and more into question (see chapter 1). However, the biotechnology companies cared not!: paradoxically, in becoming technosciences, never have technologies been so far removed from "science".

Public interests, private interests

It's that GMOs, at the end of the day, are no more than the grotesque expression of a society of exaggerated liberalism, where the search for profit prevails. Very pragmatically, citizens today know, from experience, that this search for profit is not synonymous with happiness for the majority of them. Now come of age, civil society is responding. Always better informed, it deciphers the workings of our public institutions and exposes the close ties that bind them to the big private companies, including the agrochemical, biotechnology and pharmacy giants (see chapter 4). The rapid explosion of GMOs onto the social and economic landscape has catalysed and galvanised a large refusal. The message sent to the political class is clear: *"never again will you be able to impose on us a technological choice that we have not clearly debated beforehand. And still less if this choice, like with GMOs today, brings us no benefit"*.

A total moratorium BEFORE debate

Since 1998, the European Union has observed a "de facto" moratorium on new GMO authorizations. And, excepting 25,000 hectares of maize in Spain, the few varieties authorized before this moratorium have not been grown, for want of markets. Logically speaking, this moratorium should have been taken advantage of for organising large-scale national public debates, so that political decision-making could be founded not only on a few private economic interests but also on the informed wishes of civil society. However, with the exception of Great Britain which organised a referendum (86% of English citizens do not want to eat GMOs[18]), no other country has yet led this initiative. But it's not too late. Margarett Wallström, European Commissioner for the Environment, herself recognized that in wanting to find a solution to world hunger, the biotechnology companies more than anything want to find a solution to the hunger of their shareholders[19]. We can agree on one thing: they can wait a little longer!

This is why the French Collective for a Citizens' Conference on GMOs is demanding that the government, as of now, and BEFORE any political decision[20], initiate a public debate, the terms of which (especially the calendar and resources necessary) are to be defined in concertation between partners of the economic, political and civil society sectors. At present, one of the more democratic procedures around is the citizens' conference, since it combines preliminary training (where citizens study) with active involvement (where citizens put questions) and a collective positioning (where citizens prepare a decision). In all logic, a parliamentary debate should then be set in motion, in order to discuss the citizens' opinions and advice, either to be accepted or refused, but in full knowledge of the facts, and in total transparency. We would thereby avoid that these conclusions, as with those of the debate in public organised by the 4 Sages in February 2002[21], go unheeded. The National Commission for Public Debate could be one of the organisers of this debate.

Furthermore, the collective undertakes to mobilise its other European partners, particularly during the European Social Forum of November 2003, to organise this debate in the other European countries and at a EC-institution level. The European Parliament should be one of the essential elements of this process, the issues of which largely exceed the self-contained framework of European technological commissions.

The ccc-OGM collective
October 30th, 2003

All reactions to this debate initiative should be sent to: debatpublic@infogm.org

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18, http://www.gmpublicdebate.org/, September 2003

19, EU broadside at GM firms' 'lies', October 13th, 2003, www.ireland.com

20, and particularly the transposition of Directive 2001/18 and the raising of the moratorium in France.

21, Babusiaux C., Le Dehaut Y., Sicard D., Testart J., "Plantes transgéniques : l'expérimentation est-elle acceptable? Rapport du débat des 4 sages" *(*"Transgenic plants: is experimentation acceptable? Report of the 4 Sages' debate"*), La documentation française, coll. 2003, 77 p.*

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GMOs: civil society argues its refusal
The case for a public debate: summary

French Collective for a Citizens' Conference on GMOs

General coordinator: Frédéric Prat, GEYSER

Several French associations, syndicates and NGOs have decided to draft a common "dossier of charges" against GMOs, so as to demand that the French government hold a public debate. Pending publication of the dossier in its fullest form (early 2004), the collective wanted to publish a synthesized version, most importantly in order for it to contribute to debate during the European Social Forum in Saint-Denis in November 2003 (an English-language version will be made available at this time).

This dossier takes on the GMO issue with its multiple dimensions – scientific, legal, economic and ethical. For each theme, we have given priority to an analytical approach: this dossier of charges is structured, with the supporting scientific references, around an appraisal of the debate and an analysis of the issues and proposals involved.

This summary will provide the reader with basic data, not just to understand the debate sparked by GMOs but, most importantly, to envisage the alternatives. This data will be fully developed in the dossier awaiting publication.

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