

## Defending GMO against the culture of precaution

*The WTO shown itself recently to be strongly against the "safeguard clauses" adopted between 1997 and 2000 by Germany, Austria, France, Greece, Italy and Luxembourg, aiming at prohibiting for medical reasons the use of certain GMO. In France perhaps more than elsewhere, the debate on GMO is raging since a bill tabled at the senate on 8 February 2006 and two judgments, one in December 2005 and the other in January 2006, discharged GMO reapers in the name of a "state of necessity." This state would justify the application of the precautionary principle and the destruction of GMO fields to ensure consumer protection.*

In the name of this principle, the bill opts for restrictive measurements obliging, among other things, farmers to declare parcels of transgenic plants, to obtain an authorisation before any placement of them on the market and to label their products. Violent actions against the GMO culture as well as discriminatory measures of the bill can only discourage the production of these transgenic organisms of which the real advantages for the majority of consumers are persistently ignored. This culture of precaution can give the illusion of protection and safety. It deprives, in fact, individuals of the many benefits of GMO.



on the parcels where it is cultivated, the risk of contamination of other organisms is minute. Thus, the rate of hybridisation between a transgenic variety of rapeseed and a wild grass - the rape - are 0.2%: for 100 flowers, one thus finds 0.2 rapeseed/rape hybrid seeds. If rapeseed pollens cultivated in a small field can disperse up to 800 meters (which is very rare), 50% of pollens settle in the first three meters around the field. The Senator Pastor report affirms according to him that in a large producer country of GMO rapeseed like Canada, the rate of contamination is included in a range of 0.7% to 1%.

### Exaggerated risks

The fight against GMO was organised around quite specific cases, often hammered by the press and other media. However, the examples submitted to the judgment of public opinion were much disputed by many specialists.

One of the principal lines of attack against GMO is the risk of biodiversity reduction which they would run. The thesis is founded on the contamination of certain organisms by GMO vegetable pollens transported by insects or the wind (this phenomenon obviously also occurs with pollens of natural organisms). The deposit of pollen would involve among other things a process of hybridisation which would lead to the disappearance of non GMO species. Actually, the danger, in so much as it exists, could be over-estimated. According to an INRA study published in 2002, if it is impossible to confine GMO pollens

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With regard to corn, another culture targeted by anti-GMO campaigners, the report observes that 90% of pollen falls within a radius of 5 to 10 meters around the cultivated space. If one adds to that that corn pollen dies rather quickly, the risk of contamination becomes negligible.<sup>1</sup>

Faced with doubts which exist on the contamination risks, one still frequently hears references to the famous case of the Monarch butterfly. In 1999 an article in the famous scientific review *Nature* was published which would show

<sup>1</sup> Reports show that the risk of contamination is very weak, and several insist on the technical and organisational processes which make it possible to further reduce this risk. See CETIOM, ITB, AGPM, ITCF, INRA, AgrEvo, Monsanto, Agro Rhône-Poulenc France, Novartis Seeds, KWS (2001), "Impact of the development of transgenic plants in farming systems", Final Inter-Institutional (or Inter-Institutes) Report, file n° 99/24-5; BROOKES G, "Co-existence of GM and non-GM Crops: Current Experience and Key Principles", PG Economics Ltd, October 2004; PASTOR J.-M. (2003), "Which policy of biotechnologies for France?", Senate Report n° 301; quoted information is included in Science and Future n° 703, p. 18.

that the pollen of transgenic Bt corn, spread on weed surrounding the fields, would kill in an important proportion the Monarch butterfly caterpillars. The media seized on the story immediately by blanking out the reservations expressed by the authors on their own study. An intense campaign follows which will lead in Europe to the blocking of its placement on the market. Ahead of the emotion caused by the death of the monarch, many scientific studies aim to really measure the risks. From 2000 to 2002 conclusions appeared. An AFSSA report which resumes these studies affirms (p. 25): "[of] all these studies, it arises clearly that the risk for the Monarch butterfly caterpillars of being affected by the consumption of pollen issued from Bt corn, either on "milkweeds" (which is their privileged habitat), or on leaves of corn, is negligible".<sup>2</sup>

There are many alleged dangers of GMO which were called into question.<sup>3</sup> In front of the refutation of certain hostile charges against transgenic organisms, the reaction seems sometimes unreasonable: it does not matter that the risks are negligible, the existence of the slightest uncertainty is enough to request the prohibition of GMO or, in the best of cases, very restrictive measures.<sup>4</sup> In support of this requirement, the precautionary principle is mobilised.

**To apply the precautionary principle or how to cultivate the risk**

The precautionary principle is applicable when the realisation of a damage, albeit uncertain

<sup>2</sup> AFSSA (2004), "GMO and food: can one identify and evaluate health benefits", Expert Committee Report "Biotechnologies".

<sup>3</sup> Cf. In particular concerns over GMO allergens with the Link Star corn or of the Brazil nut; concerns over the toxicity of transgenic potato or of resistance to antibiotics. On these various concerns, one can read LEPAULT S. (2005), *Il faut désobéir à Bové*, Editions de la Martinière, or again BAILEY R. (2005), *Liberation Biology - The Scientific and Moral Case for the Biotech Revolution*, New York: Prometheus Books (chapter 6 in particular). In connection with the often quoted danger of antibiotics, a report from AFSSA (2002), "Evaluation of the risks relating to the consumption of foodstuffs made up of or resulting from genetically modified organisms", reports to health, agriculture and consumption ministers, affirming: "the use of antibiotics as a growth promoter in animal nutrition and their use in human medicine and veterinary are recognised as a major source of emergence and diffusion of resistances to antibiotics, without common measurement with the hypothetical risk related to the presence of a gene of resistance to an antibiotic in a genetically modified plant" (p. 26). A risk no longer exists on this point, since one can today eliminate genes of resistance to antibiotics while obtaining GMO plants.

<sup>4</sup> Absolute purity does not exist in nature. Why wish to impose it for GMOs? For the majority of substances, one knows that everything is question of proportion.

knowledge, could affect the environment in a serious and irreversible way.<sup>5</sup> Thus, certain lobbies call on the principle of asking for the prohibition or the limitation of GMO cultures in open fields in the name of the supposed but not demonstrated risks of environmental contamination. However, it should not be forgotten that to forbid or to limit an activity under the terms of the precautionary principle also involves risks. To give up a project or to bind it with excessive limitations is to take the risk of losing the advantages which it can secure. This is precisely what the anti-GMO camp and the French bill wants to ignore. The situation of the French "GMO reapers" is particularly absurd. Indeed, after the preliminary tests in confined surroundings (in vitro, in a greenhouse), it is necessary to proceed to tests in the field in order to establish the impact of the cultures on fauna and flora, the reaction of GMOs with various types of soils, and eventually to work out effective plans of risk management. In other

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words, the purpose of the tests in the field is primarily to develop knowledge in order to improve environmental safety and reduce uncertainty. Every time entire plans of transgenic culture are destroyed in the name of the precautionary principle, one is prevented from acquiring more knowledge on GMOs.

Some will think that the precautionary principle is unwisely instrumentalised here. The danger is however inherent with the principle, insofar as where calling upon an uncertainty which in any case can never be suppressed, the principle allows any organised group to impose the most unfounded requirements. It is in any event difficult to believe that GMO manufacturers may find it beneficial to poison their customers. Many studies to date let us think that there is no significant danger in producing, marketing and consuming GMO. With caution, the majority of studies certainly do not exclude the possibility of long-term risk. This possibility is however not a probability. It reflects only the fact that an honest scientist can never claim to know and predict everything.

**Blanked advantages and promises**

Unavoidable "natural" uncertainty is enough to mobilise the precautionary principle, which leads to neglecting the fact that certain GMO present

<sup>5</sup> See the environment charter integrated in 2005 into the preamble of the French constitution.

unquestionable and important advantages regarding the environment and development.

Thus, in connection with the struggle against devastating insects due to the transgenic use of plants of the variety known as Bt, the AFSSA 2004 report concludes on the basis of many studies, that "[the] introduction of new varieties resistant to insect attacks makes it possible to decrease the quantity of insecticide treatments considerably and, in the same proportions, that of active matter in particular on the cotton culture" It adds: "[in] the developing countries, the introduction of cotton Bt has effects on the "health" of the environment with less contamination by insecticide products, on the health of the manipulators [...] not always well informed about the chemical risks [...], on the exploitative economy by freeing up labour, on the quality of by-products used as a food supplement in village farming as the cotton seed which will probably be less contaminated by insecticide residues". Prudently, the report does not plead for "GMO everything", since there are varieties which have natural properties making it possible in certain cases to reduce the use of certain chemicals. Simply, after the many campaigns which claimed manures and other weed killers to be the cause of cancer and other serious diseases, one cannot neglect the fact that certain GMO constitute a complementary and sometimes more effective weapon in environmental protection, with stronger reason when one wants to be ecological. Is it thus reasonable to apply the precautionary principle to GMO, when that would amount to using products presenting a potentially higher risk?

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Photo/image: Bob Graham, Point Pelee National Park

On a strictly economic level, GMO are also of great use. Economists now no longer doubt that the development of poor countries is linked to agricultural productivity growth. Their refusal to use GMO with superior productivity to traditional species, for the reason of very hypothetical dangers, would again deprive them of real and fast help. The example of China is emblematic in this respect. According to *Science et Vie* (July 2005), from now until 2050, the Chinese population will have probably exceeded 1.6 billion individuals. However, the demographic growth and the accelerated development that China is currently experiencing with urbanisation, is reducing

cultivated areas.<sup>6</sup> In this context, to improve productivity, the Chinese have already field tested two new varieties of transgenic rice which resist better bacteriosis (a bacterial disease) and the sadly reknown European corn borer (a caterpillar devouring cultures). These varieties are being exploited in a way. If all the rice growers adopted these varieties, without counting the effect of the reduction of diseases due to the excessive use of pesticides, the economy on productive factors and pesticides would be approximately 4 billion dollars per annum, on the assumption of a purchase price of transgenic seeds being higher than the price of traditional seeds. Many results corroborate the considerable economy in financial, material and human resources which makes it possible to carry out biotechnologies in general<sup>7</sup> and GMOs in particular. By increasing the agricultural productivity and by reducing the use of chemicals, the progress allowed by GMO will unquestionably take a part in the rise in farmers' incomes and economic development. Indeed, the released resources could be assigned to the pursuit of objectives which were previously out of reach.

Lastly, beyond the growth of agricultural productivity, certain GMO still in the test phase open up very interesting possibilities as regards the fight against malnutrition. There is no question of opposing the spectre of destruction to the utopian biodiversity of tomorrow which cries out for all fallow ground. Nevertheless, on the technological level, the development of transgenic products can significantly improve the health of those who suffer seriously from food deficiencies, in particular vitamin A.<sup>8</sup> The example of GMO rice says "golden rice" is a good illustration. Golden rice is enriched in a precursor of vitamin A - beta carotene (or provitamin A) -, which makes it possible to reduce deficiencies in the developing countries. Thus, a Beyer and Potrykus study shows

<sup>6</sup> From 1975 to 2000, the rice surface was reduced by 6 million hectares, a reduction fortunately compensated for by the growth of productivity thanks to processes of rice hybridisation. However, productivity stagnated since the end of the 1990s.

<sup>7</sup> See OCDE (2001), "*Biotechnologies serving industrial durability*", GTB (Groupe d'Etudes sur les Biotechnologies) Report, in particular pp. 49-50.

<sup>8</sup> The deficiency in vitamin A appears through serious clinical symptoms (blindness, etc). UNICEF estimates that this deficiency would have touched in 1992 124 million children. Each year 500 000 children globally would become blind in an irreversible way because of this deficiency.

that it would be necessary to consume reasonable quantities of golden rice to significantly reduce deficiencies and their health consequences. Certain results are summarised in the following table:



Conversion factor according to organisms	Consumption of "golden rice" in grammes/day	
	Bioavailability of the precursor : 100%	Bioavailability of the precursor : 50%
X12	90 to 112	180 to 224
X6	45 to 56	90 to 112
X4	30 to 38	60 to 76

Source : AFSSA, 2004, p. 44.

Notes: The bioavailability of provitamins A (beta-carotene) results from the effectiveness of digestion and their absorption then from their later conversion into active metabolites. The conversion factor quantifies the conversion of provitamins A into retinol, the active form of vitamin A. For man, the average factor of conversion is in general 6, that is to say 6 micrograms of beta-carotene for 1 microgram of retinol. The results presented in the table are obtained starting from the favorable but realistic auxiliary assumptions that one finds in AFSSA (2004, pp. 43-44).<sup>9</sup>

On the basis of this study, a daily consumption of golden rice of 30 to 224 grammes could significantly reduce deficiencies and their consequences. This estimate is only disputed by certain ONG who claim that several kilogrammes per day would be necessary for sufficient caloric intake! But to suppose that these latter are right if one admits, like all specialists, that a single strategy cannot exist to enrich the vitamin A supply, it is necessary at least to admit that golden rice constitutes a supplementary means which should not be neglected. This is why the AFSSA report concludes (pp. 44-45): "[it] would in any case be prejudicial to oppose the development of the culture of traditional plants or the addition of synthetic vitamin A to the use of golden rice [...]. Nothing indicates that the step which led to obtaining the first varieties of golden rice is directed towards failure. It should thus be able to be continued in peace with the critical encouragement of public opinion."

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There is certainly the right to be wary with respect to GMOs. One can for example be astonished by Chinese government declarations on their transgenic rice, a government which is accustomed to retaining information. However, it remains annoying to blank out or relativise the many studies which concluded that GMOs, or more generally biotechnologies, used directly or indirectly by the general public do not present a significant risk.<sup>10</sup> If one leaves aside the formidable progress which GMOs in the field of the pharmaceutical production allow, the majority of Americans have eaten biotechnological products for several decades. Today, 70% of food present on store shelves would contain genetically modified matter. In fact, any person concerned by GMOs should also be so by conventional food which itself causes a quantity of allergic reactions (Kiwi fruit, peanuts, etc.) and which are not prohibited. One should also know that GMO were subjected to a series of rigorous tests which were often missing with conventional products, since at the time when man started to consume them, scientific tests in a controlled medium did not exist. Finally, in regard to current elements of the debate, the opposition to GMO amounts to ignoring the facts so as to hold on to the most doubtful assumptions. It is the philosophy of the precautionary principle. It inspires at the same time the French bill and more radically the prohibition of transgenic cultures. For how long then will we have to then pass up on certain advantages or benefit (only) sparingly to avoid very uncertain risks? It is unfortunately in the nature of the principle of precaution and in the interest of the anti-GMO camp not to bring any clear answer to this question.

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<sup>9</sup> See European Commission, "EC-Sponsored Research on the Safety of Genetically Modified Organisms: A Review of results", Europa, 2001, <http://www.europa.eu.int/comm/research/quality-of-life/gmo/index.html#text>.

<sup>10</sup> Bailey observes that in 2005 researchers boosted the beta-carotene content more than twentytwofold (*Op. Cit.*, Chapter 6).

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