



## CONTROVERSIAL ACTIVITIES

# GENETICALLY MODIFIED ORGANISMS IN FOOD AND FEED APPLICATIONS

## 0. Background

The first transgenic plant, a tobacco plant, was created in 1983. In 1994, the first GMO, a herbicide resistant tobacco plant, was commercialised in Europe. In 2000, GMO culture represented 41 million hectares. Monsanto manufactures 78% of GMO commercialised worldwide. Transgenic animals are produced for medical purposes but not (yet) for food production.

GMOs are used for multiple applications:

- Food applications : Pest resistant plants ; pesticides resistant plants (99% of today's applications) – first generation GMOs. Enriched seeds/plants (higher vitamin content, faster growth, better taste, etc) – second generation GMOs;
- Industrial biotechnology to produce fine chemicals: enzymes, food additives, detergents, etc;
- Non-food agriculture and silviculture: trees, cotton, colza,... (to produce oil, gazoil, fibres, etc);
- Pharmaceutical products.

GMOs used as seeds, in human and animal food, are mature issues subject to numerous debates. They have their opponents and partisans. Currently, there exists no recognized and universally accepted study about impacts and benefits resulting from their applications.

In its Human Development Report 2001, the United Nations Development program is calling for a full risk-benefit assessment of new technologies and recognizes their potential in helping cut malnutrition<sup>1</sup>.

Potential negative arguments include:

- Gene flow: foreign genes from genetically engineered plants could be carried by pollen, insects, wind, rain and flow into other crops and transmit their traits;
- Unintended effects on non-target species: genetically altered plants could produce substances that might harm birds and other animals;
- Threat to biodiversity: genetically engineered plants could overpower wild species and thereby reduce biodiversity;
- Increased use of chemicals and pesticides: According to opponents, chemical companies are genetically engineering plants to be resistant to herbicides they manufacture so they can sell more to farmers. Pests that are resistant could evolve, needing stronger chemicals;
- Toxic and allergic reactions in humans;
- Lack of safety tests, lack of track records, and lack of labels to inform consumers;

<sup>1</sup> United Nations Development Program, "Human Development Report 2001 – Making new technologies work for human development", 2001



- Patenting and then ownership of genetic material by biotech companies;
- Negative impacts on the agricultural economy (populations, development) especially in developing countries; dependence on farmers vis-à-vis a limited number of suppliers; producing their own seeds prohibited for them;
- Antibiotic resistance: antibiotic resistant markers are used to monitor the take-over of the desired traits; they could transfer resistance to humans or other organisms;
- Pleiotropic effect: unknown protein combinations in the organism, which may result in secondary effects.

The strongest argument for using GMOs is ensuring global food safety. Developing drought-resistant, disease-resistant, more nutritious (vitamin, protein) crops could help cut malnutrition.

Other potential positive arguments might include:

- Reduction in the application of chemical pesticides via the use of transgenic pest-protected plants<sup>2</sup>. Genetic manipulation could be considered as part of organic agriculture, using biological processes instead of chemical ones;
- Greater biodiversity in systems where pest-protected crops replace the use of non-specific insecticides;
- No more important risks than those from traditional techniques – Mankind has been manipulating the genetics of crops for 10,000 years. Only the tools have changed. Before the development of molecular biology techniques, genetic mutations were already achieved by 'artificial' tools (ion beams, X rays, toxic chemicals, microorganisms, etc). A lot of today's cultured plant varieties were obtained by these ways;
- Increased yields and lower price: new rice strains (biotechnologically engineered) can increase yields by 30-40%.

Europe uses the precautionary principle. There is a European "moratoire" on the GMOs since 1999, which only allows import of two GMO crops ('Maximiser' maize of Novartis and 'Round-up' soja of Monsanto). Culture of GMO plants is forbidden except for pilot projects (which are submitted to special authorization). Since September 1998 (n° 1139/98, modified by 49/2000), a European legislation imposes the labelling of products containing GMOs. Since April 2000, it is also the case for GMOs that enter in the composition of products as additives and flavours. Nevertheless, labelling is not mandatory for a contamination level below 1%. Moreover, this legislation does not apply for products that are chemically equivalent to traditional ones. In other words, it is not mandatory to label a GMO derivative if the foreign gene has been denatured or eliminated during the manufacturing process, as it is the case for soya oil for instance. A new European legislation is being prepared on labelling and traceability of GMO in food and feed. According to this, the traceability of GMOs will be required during the whole manufacturing and distributing process (from the farm to the table). Labels will have to inform the consumers about the presence of any ingredient produced from a GMO.W

## 1. Genetically Modified Organisms - Definition

A genetically modified – or transgenic – organism (GMO) is a living organism of which genetic material has been modified. Genetic modification occurs at least through the use of the following techniques: (i) recombinant DNA techniques using vector systems (specialised bacteria); (ii) techniques involving the direct introduction into an organism of heritable material prepared outside the organism including micro-injection, macro-injection and micro-encapsulation; (iii) cell fusion (including protoplast fusion) or hybridization techniques where live cells with new

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<sup>2</sup> According to the National Agricultural Statistics Service in the US, 2 million fewer pounds of pesticide were used in 1998 to control the cotton bollworm than were used in 1995 before "Bt" cotton (cotton containing a toxin making it resistant to pest) was introduced



combinations of heritable genetic material are formed through the fusion of two or more cells by means of methods that do not occur naturally<sup>3</sup>.

With genetic modification, plants can be engineered to contain, for example, gene for pest protection. The greatest difference between genetic manipulation and traditional breeding techniques is that the former is a forced union, which could go beyond species barriers. A potential GMO or a potential GMO-containing product is considered as a commodity that could potentially be a GMO or a GMO-derivative, because of the availability of GMO related goods on the concerned market. For instance, in Europe, maize and soya are potential GMOs and their derivatives are potential GMO-containing products.

## 2. Degree of involvement

- Focus on **sector related**: four categories
  - **Production**: developing or growing GMOs for food or beverage applications
  - **Transformation**: using GMOs for manufacturing food or beverage products with two possibilities
    - **DC**: Deliberate Choice: the company intentionally manufactures GMO containing products
    - **PI**: Potential Involvement: the company does not intentionally manufacture GMO derivatives but manufactures potential GMO derivatives. If such a company has a comprehensive policy (P) in place in order to avoid manufacturing of GMO containing products, it is considered as not being involved.
  - **Distribution**: marketing, sale or retail of food or beverage products, with two possibilities again:
    - **DC**: Deliberate Choice: the company intentionally markets GMOs or GMO containing products
    - **PI**: Potential Involvement: the company does not intentionally market GMOs or GMO containing products but markets potential GMOs or GMO containing products. If such a company has a comprehensive policy (P) in place in order to avoid marketing of GMO containing products, it is considered as not being involved.
  - **Catering**: any establishment preparing and/or offering meals or drinks is considered as using potential GMOs or GMO-containing products (hotels, restaurants, cafés, airlines companies, catering firm, etc), unless there is a strict policy in order to avoid this.
- Focus on company **avoidance of GMO** (practices and/or policy)

If a company is active in potential GMOs or GMO-containing products, does it have a policy statement to source non-GMO ingredients or avoid GMOs, or business principles explicitly mentioning the objective to offer GMO-free products or not (+ P or- P)?
- Focus on the **degree of participation (d° of part.)** in an activity: 2 categories
  - A. - The company has consolidated participation in other companies, activities in the abovementioned GMO-related fields or;
  - The company has non-consolidated participation in companies that are, directly or indirectly through majority participations, involved in the abovementioned GMO-related fields AND these activities generate 1% or more of the company's revenue;

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<sup>3</sup> **Source:** Council Directive 90/220/EEC on the Deliberate Release into the Environment of Genetically Modified Organisms



- B. The company has non-consolidated participation in companies involved in the abovementioned GMO-related fields AND these activities generate less than 1% of the company's revenue

Involvement of a company in genetic manipulation could be assessed as mentioned in the following table. (**M**= Major involvement, **m**= minor involvement, **N**= No involvement)

Sector d of part.	Production	Transformation			Distribution			Catering	
		DC	PI		DC	PI			
			- P	+ P		- P	+ P	- P	+ P
A	<b>M</b>	<b>M</b>	<b>m</b>	<b>N</b>	<b>M</b>	<b>m</b>	<b>N</b>	<b>m</b>	<b>N</b>
B	<b>m</b>	<b>m</b>	<b>N</b>	<b>N</b>	<b>m</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>N</b>

