The complexity of chemical products and the pace of their development have not been matched in recent years by systematic research into their environmental impact. Serious and undesirable effects have, however, been detected in both human health and the environment. Toxic products have been found in the air, water and soil, not to mention the food we eat. Between 1977 and 1987, accidents involving chemicals resulted in 5,000 recorded deaths, 100,000 injuries and the evacuation of 620,000 people.

**Care and foresight**

Fortunately, relatively few chemicals have such dire potential. If they are used in a controlled and responsible way, the vast majority of citizens have nothing to fear. Nevertheless, more and more care is needed if we are to avoid horrific accidents such as those that occurred at Bhopal, India in 1984 and Seveso, Italy in 1976. If disasters are to be prevented, there is an urgent need for accurate scientific modelling of the potential long-term impact of chemicals on health and the environment.

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**Genetic modification**

The latest gene technology means we can now transfer inherited characteristics from one organism to another. This produces Genetically Modified Organisms (GMOs) — bacteria, fungi, viruses, plants, insects, fish or mammals, whose genetic material has been artificially altered in order to increase resistance, yield or some other physical property.

Once a GMO has been released into nature (or brought onto the market), it might prove more successful in evolutionary terms than its natural counterparts. The repercussions of such competition are both unpredictable and irreversible.

Doomsday scenarios apart, it is plain that the benefits genetic engineering can bring to humankind must be properly managed if health and the environment are to be protected.
## Europe in action

### Prevention better than cure

Europe’s concern for this issue is evident from the speed with which it built up a formidable legislative arsenal to deal with hazardous substances. Some observers view dangerous chemicals as the gravest environmental threat of all.

### Classification, labelling and packaging of hazardous substances

A framework directive was adopted in 1992 which covers all substances and preparations defined as explosive, oxidising, inflammable, toxic, corrosive, irritating, sensitising, carcinogenic, mutagenic, harmful to reproduction or environmentally damaging. The directive also set the new objective of evaluating the risks that chemicals pose to human beings and the environment. Manufacturers and distributors are now obliged to provide the authorities with detailed technical information, to state any undesirable effects, and to draw up safety instructions and packaging and labelling information.

At the same time, the directive introduced stricter standards for the packaging and labelling of hazardous substances. Packaging must be sufficiently robust to prevent leakage or corrosion during handling, while labels have to include the name of the substance, one or more warning symbols, details of potential hazards and safety recommendations.

## Use and marketing

The use of hazardous substances is governed by a 1976 framework directive designed to protect the public and the environment from certain hazardous chemicals. The appendix listed a number of products which could no longer be sold directly to the public and whose use was now strictly limited. Supplementary directives have restricted the use of products like asbestos, mercury, cadmium and benzene (in toys) and have imposed labelling and packaging requirements (particularly for detergents, insecticides and perfumes).

Genetically modified organisms open up economic perspectives but create fears as well.

(Lab technician preparing cultures)
Import and export

Regulations adopted by the Community in 1992 have created a joint information system on imports and exports of certain chemicals that are banned or severely restricted because of their potentially harmful impact on human health and the environment. When a product is to be transported to a new destination for the first time, Member States are now obliged to inform the importing country of any potential hazards no later than 30 days before the date of export. The regulations also oblige exporters of hazardous chemicals to package and label products destined for export in the same way as those sold on the Community market.

Plants protection products

A directive on the placing of plant protection products on the market was adopted in July 1991 and created a harmonised system for approving products in this field. Basically speaking, the directive prevents plant protection products from being sold unless they meet certain specified ‘quality’ criteria, according to which they must not have an unacceptable impact on human beings, animals or the environment.

Tackling genetics

There is basically no limit to the potential of genetic engineering. In theory, a gene from any species can be implanted in any other. Genetic manipulation is already used in agriculture and the food industry, in pharmaceuticals and decontaminants and in the production of new materials and energy sources.

Europe has taken a precautionary approach, introducing legislation designed to protect its citizens’ health and the environment while simultaneously creating a unified market for biotechnology. A directive on the contained use of genetically modified micro-organisms covers all activities relating to GMO’s, at both research and industrial level. A directive on the deliberate release into the environment of genetically modified organisms requires environmental evaluation and step-by-step approval for the dissemination of GMO’s. The directive covers all such releases, whether small or large in scale, commercial or otherwise. Its main aim is risk management. As with all other technologies, the risks associated with genetic engineering have to be identified, evaluated and appropriate measures taken. The directive’s approach to risk management is based on the step-by-step development and testing of new organisms, the risk and impact of which have to be analysed case by case.

Genetics: what for?

The most common of the 16 varieties of genetically modified plants cultivated in Europe are turnips, maize, potatoes and sugar beet. The added genes often relate to herbicide resistance (50%), while in other cases they are concerned with the sterility of male plants.
Taking responsibility

Hazardous substances: an international concern

In 1984, the NRC (National Research Council) in the United States published statistics on the toxicity of around 50,000 chemicals currently in use in that country. Another study (USEPA, 1991) highlighted the fact that the majority of substances discharged into water are industrial and chemical in origin (60%). The NRC figures also show how little information is available on the toxicity of chemical substances. What information there is tends to be limited to pesticides, cosmetics, medicines and food additives.

We can’t draw up a systematic and detailed review of the risks associated with chemical products without first collating all the available information on existing substances. This is an immense task and so international programmes have been set up to gather data and coordinate results. Programmes of this kind are our primary source of information on hazardous substances.

A special legal register has been set up to record data from 12 countries and six international organisations. In 1989, it contained 42,000 records on over 8,000 substances.

Biotechnology and the Earth Summit

The problem of access to genetic resources was raised in the text of the Rio Biodiversity Convention which sets out to regulate access to these resources, to protect intellectual property rights on living materials and to promote technology transfers.

The precautions taken show the risks of contamination, from the experimenter to the preparations and vice versa.