



## The Conservation Council of Ontario

# Submission to the Royal Society of Canada's Expert Panel on the Future of Food Biotechnology

April 28, 2000

## **Process**

The Conservation Council has reviewed the mandate, terms of reference and membership of the Expert Panel on the Future of Food Biotechnology. The issue has been discussed at two meetings of the Council (February 23, and March 29), a position paper has been developed through a committee of the Council with contributions from Council members, and the final position has been approved by the Council at its meeting of April 26.

In preparing our comments, we first identified the scope of issues that were of concern to Council members. Next, we assessed the ability of the Expert Panel's mandate, terms of reference, and membership to address the full range of issues identified and develop a complete and balanced report that would provide the people and the government of Canada with meaningful recommendations.

## **Some Areas of Concern Regarding Biotechnology and Food**

The following areas of concern and explanatory notes do not necessarily reflect the views and opinions of our members. They are presented as a list of concerns that have been identified and that need to be addressed in full by the Canadian government and any public review of food biotechnology.

With genetic engineering (GE) it is possible to improve the nutritional value of products and to include traits which a product wouldn't naturally have. Such a new concept, especially for something as fundamental to human life and health as food, has the possibility of changing the planet as we know it and cannot therefore be something rushed into or taken lightly. As consumers become more aware of their health and eating habits, genetically modified (GM) foods have taken the spotlight (particularly in Europe) and thus there have been a number of questions raised about potential impacts of novel plants produced through genetic modification.

The issues involved are contentious and complex. The following areas of concern are ones that the Council believes need to be addressed by the Expert Panel:

- Ethics
- Research and Corporate Interests
- Approval Process / Regulation
- Effectiveness of GM Seeds
- Impact on Lesser Developed Countries
- Economics
- Genetic Pollution
- Herbicide Tolerance and GURTS
- Insect Resistance
- Habitat/Ecosystems and Diversity
- Monoculture
- Health and Safety
- Consumer Choice

### **Ethics**

GE generally means shifting from the natural laws of genetics that involve vertical inheritance (i.e. change within the same species) to horizontal inheritance (movement of genes from one to another species). Ethicists have raised the question of the appropriateness of human intervention in the genetic structure of species.

### **Corporate Control**

Concern has been expressed over patenting of plant and animal genes, and large private corporations controlling the supply of food material sources. The increased power of huge biotechnology corporations over life and its impact on both the developed and developing world are further ethical issues to be addressed.

### **Research Credibility**

By far the majority of university-based research conducted into genetic engineering has been in the area of product development. Corporate sponsorship of biotechnology research creates an inherent bias in the results. Very little independent research has been conducted into ecological implications of genetic engineering in agriculture.

### **Approval Process / Regulation**

Any new product presents unique hazards and so must be given careful consideration, long-term research and testing both in large and small scale projects. It should be subject to strict legal processes by an independent body upholding the precautionary principle. Extensive thought should be given to who accepts liability in the case of anything going wrong.

### **Effectiveness of GM Seeds**

Recent experimental trials appear to indicate that genetically engineered seeds may not increase the yield of crops. This and the fact that the causes of hunger are generally poverty, inequality, and lack of access, as opposed to lack of food, raise questions as to the requirements for such technology.

### **Impact on Lesser Developed Countries**

As less developed country farmers depend on farm saved seed for their survival, genetically sterile seeds could adversely affect these farmers and communities dependent on them.

## **Economics**

GE technology is contributing to the integration of the large profit-driven seed and chemical industries. For example, seeds modified by genetic use restriction technology require chemical inducers to switch on and off plant traits. Whilst the new technology could in theory aid farmers in terms of herbicide resistance, drought resistance, pest control, and other desired crop characteristics, it has the potential to lead to increased chemical use (see also below) and resulting costs to the farmer. Farmers claim they need GM seeds in order to lower their production costs (through reduced herbicide and pesticide costs). These costs are significant when we realize that many farmers are operating close to the line. A number of field trials have, however, cast doubt on cost reductions in the long-term.

## **Genetic Pollution**

Genetic pollution refers to the possibility of engineered traits genes moving into other plants of either the same type or closely related species i.e. genes flowing from plant to plant, plant to bacteria or plant to virus. A lack of segregation between genetically engineered (GE) crop fields and other habitats means traditional pollination (by wind, insects or birds) may result in the uncontrolled mutation, multiplication and spread of genes from the modified plants.

Built-in resistance to herbicides may pass to closely related species, with the result that farmers will run the "chemical treadmill" using increasingly higher levels and additional sprays of herbicides to prevent superweeds (undesirable plants or even other crop species with a high tolerance for otherwise toxic chemicals) from overwhelming their fields. Virus escapes could lead to new virus resistant weeds and GE species and hybrids may pollute neighbouring "organic" farms. GE viruses could mix with natural viruses infecting the plants, and thus create a more virulent virus and new harmful viruses. Toxic plants may also harm non-target organisms such as butterflies, ladybugs and soil organisms. Several studies have indicated that beneficial insects and soil organisms may be reduced by exposure to GE crops.

## **Herbicide Tolerance and Genetic Use Restriction Technology**

Herbicide tolerance means herbicides can be used which will kill the weeds and not the crop. Genetic Use Restriction Technology (GURT) means an external chemical inducer could turn on/off genetic traits (a chemically dependent seed).

Herbicide resistant (HR) crops and GURT intrinsically imply an increase in chemical use. HR crops may cause an increase in use of the herbicide for which the crop is resistant due to a larger window of spray opportunity. Weeds will adapt and require more spraying to deal with altered behaviour and new weeds may appear because traditional weed populations have been eliminated by the spraying. Herbicides pollute groundwater as well as causing various forms of ecological damage and health implications (especially in children). Sustainable herbicide management may be discouraged.

## **Insect Resistance**

Insect resistant plants are designed to produce substances to kill or repel pests. Repeated use of almost all control agents, e.g. pesticides and antibiotics, will inevitably lead to a resistant population of pests. GE crops may increase resistance of pests to pesticides and even the gene in the crop itself may necessitate the use of additional and more toxic sprays. Most crops contain a modified gene from *Bacillus thuringiensis* (Bt) to produce toxic leaves and fruit. Bt has long been used by organic farmers as a relatively harmless insecticide. With long-term use, insects may gain resistance to built-in pesticides, rendering Bt useless.

Organic farmers and farmers who implement integrated pest management and organic agriculture techniques (which rely on ecological processes rather than chemical ones) would then have no choice but to use pesticides that are harmful for human health, particularly children, as well as fish, beneficial and non-target organisms, birds, and other wildlife.

By reducing populations of targeted insects, pest resistant plants may affect those species and other insects that compete, predate or are parasitic upon them, causing unintended side effects.

#### **Habitat/Ecosystems and Diversity**

Modified species or hybrids with wild/organic species may invade natural habitats and thus alter the ecosystem balance in the long-term through replacement of one or two species.

#### **Monoculture**

GE plants can lead to the loss of agricultural diversity through monoculture -- one crop dependency. GE crops also reinforce poor crop rotation practices. Crop rotation is a sustainable approach to pest management, one which also helps control other environmental problems such as soil loss and water quality. A single crop is also more vulnerable to new strains of pathogens or insect pests.

#### **Health and Safety**

Without careful monitoring GE could go seriously wrong and result in hazardous toxins in food. Allergens may be transferred via proteins from foods to which people are allergic into unlabelled foods which people think are safe. Lack of labelling also affects dietary preferences (e.g. vegetarians or Muslims).

#### **Antibiotic Resistance**

A marker gene is generally inserted along with the desired gene into new plant, the most commonly used marker being the bacterial gene for antibiotic resistance. Widespread use of antibiotic resistance markers could increase antibiotic resistance. Antibiotic resistance genes in crops could pass to bacteria, making traditional antibiotics ineffective.

#### **Consumer Choice / Labelling**

The consumers' right to know what they are consuming, and free choice of products, can be denied by lack of labelling

## **Comments on the Expert Panel**

### **Comments on the Proposed Mandate**

Members of the Conservation Council have reviewed the mandate, terms of reference, and membership of the Expert Panel. We offer the following observations:

#### **Re: Mandate**

- 1) There is an absence of any reference to conservation and sustainable use of biological diversity but rather a focus on human, animal and environmental "health".
- 2) The mandate assumes that food biotechnology should and will continue to be developed. Without a prior assessment of the need for food biotechnology and the willingness of Canadian consumers and international markets to purchase the products of food biotechnology, the entire process of the Expert Panel may be seriously flawed.
- 3) The mandate assumes that the environmental and health impacts of food biotechnology can be managed through science and the regulatory system. This too may be a flawed assumption. The panel should clearly identify the mechanisms whereby the products of food biotechnology may be deemed "unsafe" for release into the environment. In particular, the use of the precautionary principle needs to be clearly defined.

### **Re: Terms of Reference**

- 1) The terms of reference for the panel do not adequately reflect the scope of the issue (see the above section on areas of concern). In particular, they do not cover the critical areas of needs assessment, the precautionary principle, the funding and credibility of scientific research, social and consumer values, international development, corporate vs. social control.
- 2) The current terms of reference conceive of potential impacts narrowly in a reductionist framework (references to environmental, human and animal "health"). The panel needs to adopt a broader perspective on the issue of environmental harm, as mandated in Article 8 of the Convention on Biological Diversity.
- 3) A number of specific tasks that would be particularly desirable for the panel to undertake are not identified under the current proposed terms of reference. They are:
  - To identify the existing short- and long-term studies addressing these risks and concerns as well as gaps requiring further short- and long-term studies.
  - To assess the quality and significance of these studies.
  - To specify means of undertaking these studies.
  - To delineate specific, open, and transparent means by which the public can gain an effective voice in the assessment of risks and benefits and the development of appropriate policies safeguarding health and the environment, especially biodiversity.
  - To identify means of securing the corporate accountability of the biotech industries in regard to preservation of biodiversity, and soil and environmental health, as well as of food safety, with particular regard to allergens and allergic reactions.
  - To address the role of the precautionary principle in protection of health and the environment and to identify means of securing its application.
  - To identify mechanisms to preserve open, scientific investigation and reporting.
- 4) There are no mechanisms for public consultation, review and input. We realize this is not traditionally part of the Royal Society's procedures, however we believe the high public profile this contentious issue has received necessitates a more open process. At the very least, we believe the public should have an opportunity to comment on an issues paper at an early stage in the panel's deliberation.

### **Re: Membership**

- 1) There appears to be limited expertise on the panel in ecology, environmental regulation or policy, or food systems and policy.
- 2) Even within the stated areas of expertise of the panel members, the questions of bias and conflict of interest need to be addressed. We support full disclosure of the direct and indirect conflicts of interest that may arise through funding of biotechnology research and related research by the biotechnology industry.

## Recommendations

Overall, the mandate, terms of reference, and membership of the panel appear so narrowly defined that the credibility of the process may be in question. Without critical, balanced and complete analysis of the issues, the resulting report would contribute little to the resolution of one of the most important and far-reaching challenges currently facing Canadians and our governments.

### Recommendation #1

- **That the full range of immediate and long term implications of existing and emerging applications of modern biotechnology on human health, the environment, the conservation and sustainable use of biological diversity, and Canadian society as a whole (including social, economic and ethical issues) be investigated, and; that recommendations be made regarding appropriate responses to these issues to the Government of Canada.**

There are two options, in our view, for fulfilling this recommendation. They are:

#### *Option 1: broaden the mandate and membership of the Expert Panel.*

The new mandate would include social, economic and ethical considerations. The broader membership would include individuals with expertise in social sciences and the humanities. This approach would also require that the Expert Panel include public consultation in its activities

- Under this option, the mandate of the Expert Panel should read:  
*Investigate the full range of immediate and long-term implications of existing and emerging applications of modern biotechnology for human health, the environment, the conservation and sustainable use of biological diversity, and Canadian society as a whole, including social, economic and ethical impacts, and make recommendations regarding appropriate responses to these issues by the government of Canada.*
- The range of expertise on the Panel should be expanded. In particular, the Panel would need to include members who have a much stronger emphasis on social sciences and humanities.

#### *Option 2: identify a new process for addressing the broader questions*

- a) leave the investigation of scientific questions regarding potential threats to human health, the environment and biological diversity with the Expert Panel and adjust the title, mandate, terms of reference, and membership accordingly;
- b) identify another agency or process for addressing the complete range of health, social, economic, environmental, and ethical implications of food biotechnology.

Under this option, the Royal Society would need to make the following changes to the Expert Panel:

- Change the name of the panel to properly reflect the scope of its task. For example, the panel could be called "The Expert Panel on the Safety of Food Biotechnology".
- Adopt a mandate to reflect the scope of the Expert Panel's work:  
*Investigate and report on potential immediate and long-term threats to human health, the environment, and the conservation and sustainable use of biological diversity arising from existing and emerging applications of modern biotechnology in the agriculture and food sector (including crop plants, animals, fish, feeds, fertilizers and pesticides).*

- Adopt a broader perspective on the issue of environmental harm, as mandated in Article 8 of the Convention on biological diversity. The Convention's approach not only contemplates the direct impacts on organisms, but also considers the possibility of indirect harm as a result of the disruption of the ecosystems upon which organisms depend and of which they form a part. The panel's expertise in ecology needs to be strengthened in order that it can address these issues appropriately.
- It is also critically important that the impacts of biotechnology products not be looked at in isolation from the agricultural systems of which they are part (e.g. looking at herbicide resistant crops in terms not only of the direct impacts of these crops on the environment, but also of the herbicide use and cropping patterns that are inherent in their use). The impacts of agricultural systems need to be examined, not just the individual components of them that happen to be direct products of modern biotechnology.

This approach makes it clear that the panel is being asked to investigate scientific questions of potential threats to human health, the environment and biological diversity. It is not asked to answer normative questions about appropriate responses to those threats and should not address them.

This option also makes it clear the panel is not addressing economic, social, or ethical implications of these applications of the technology. Other processes will have to be established to address these issues. There will be no closure on these issues until such processes are established.

The overall theme of this option is to broaden the scope of environmental and health impacts to be investigated by the panel, but to narrow the mandate of the Panel to deal only with those questions that can be answered by science. Questions of potential impacts would be included, but questions of what should be done about these potential effects would be excluded. The latter are value-laden questions that should be dealt with through another process.

## **Recommendation #2**

- **That extensive, open and meaningful consultations with the public on these issues be undertaken, and that all submissions be made available to the public.**

Regardless of which option the Royal Society should choose, the Expert Panel should operate in a manner which is seen to be both fair and open. The Panel's work will require extensive and meaningful consultations with the public on these issues. The issues need to be addressed in an open manner, particularly in light of the level of public financing provided to the biotechnology industry by the Government of Canada.

In particular:

- members on the Panel should disclose any direct and indirect conflicts of interest that may arise through funding of their biotechnology research and related research by the biotechnology industry
- the Royal Society should encourage public participation in its review
- reports of the Panel and all submissions should be made available to the public on the Royal Society's internet site.