



appendix 3

Outcomes of Consultation: Submissions  
from the Public

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# 3.5 Evidence and uncertainty

## Background

Warrant item (b), called for information on:  
the evidence (including the scientific evidence), and the level of uncertainty, about the present and possible future use, in New Zealand, of genetic modification, genetically modified organisms, and products.

While only a small percentage of public submitters commented specifically on evidence matters, greater numbers expressed concern about the levels of uncertainty about current and future use of genetic modification technologies.

## Outline of this section

This section of the report includes:  
the views of public submitters in general, and with reference to:

- environmental matters
- social matters
- health matters
- food matters
- economic matters.

## General comments

Generally, public submitters were unlikely to raise issues related to uncertainty and evidence. (As Table 3.10 shows, 359 submitters commented on uncertainty and the nature of evidence.) However, given the large number of public submitters overall, even this small proportion covered a wide range of topics. Although public submitters rarely addressed the issue as outlined in the Warrant specifically, anxiety about uncertainty permeated their submissions. As well as raising concerns about uncertainties in general and a need for public information, they commented about uncertainty with respect to four areas: environment, health, food and economy. In each of these areas, submitters wrote of uncertainties around risk,

safety, costs and benefits, other compounding factors, such as ethical considerations, and any evidence to support their apprehension.

Many submitters raised concerns over the lack of trustworthy information available to the public. There were two main perspectives. First, there was a call for more information from people who felt ill-informed to make a decision about genetic modification, and wanted all the facts presented in an unbiased forum. Second, some submitters wanted to see the government provide funding for the dissemination of information highlighting the risks of genetic modification. This second group were angry that the government was funding pro-genetic modification groups (perceived as linked to big business) while groups opposed to genetic modification (perceived as small collections of individuals) were struggling to raise funds and make themselves heard.

Submitters also made general comments, in particular noting their lack of faith in the safety of genetic modification technologies in general, given the relative ‘newness’ of the technology, insufficient or inadequate testing, equivocal results, and their lack of trust in the corporate producers and their claims of benefits from genetic modification. The lack of trust, which often was also extended to scientists and government (and the legislative and regulatory framework), stemmed from their belief that these entities do not work in the public interest. Some public submitters also noted their lack of certainty about the levels of genetic modification research and application in New Zealand currently and their lack of faith in the ability of producers to control the genetic modification technologies they develop and use.

Public submitters also displayed concern about safety assurances by scientists, arguing that the procedures used to genetically modify organisms were themselves random, and scientists could not be sure where exactly inserted genes would “end up” in the organism. They worried that this could result in dangerous products with unforeseeable consequences.

Public submitters tended to judge evidence of risk as more certain and evidence of safety and benefits as less certain. Submitters were generally aware that there was no conclusive proof of serious danger, but felt that there was ample to justify a precautionary approach. The comment was frequently made that “... absence of proof of risk is not proof of absence of risk.” Submitters backed up their scepticism about genetic modification safety and claimed benefits by referring to:

- unanticipated negative environmental and economic impacts of past (non-genetic modification) technologies and current genetic modification technologies. Amongst the latter, the examples identified included studies

showing Monarch butterflies dying from genetically modified corn pollen, genetically modified crops affecting the soil, and cross-pollination from genetically modified crops to wild varieties creating “super-weeds”

- unanticipated health risks such as new allergies arising from genetically modified pollen, the evidence that insertion of genes from the Brazil nut into soy could cause potentially fatal allergic reactions in people eating soy products, the poisoning of a number of people in America through a batch of genetic modification-produced tryptophan, and studies showing evidence of possible horizontal gene transfer through genetically modified pollen in bee guts
- some submitters produced as evidence the application by Monsanto to increase the allowable residue of its herbicide ‘Round-Up’ on food to support their concern that genetic modification would necessarily result in greater chemical use in food production
- bad company practice through previous disasters (including non-genetic modification technologies) in which companies denied wrongdoing, hid evidence of risks, and attempted to evade responsibility
- the ambiguity of scientific results, given factors such as a perceived untrustworthiness of scientists, and conflicting reports from scientists.

Many submitters displayed outrage and anger over pro-genetic modification claims of benefits arising from genetic modification. This outrage was most often expressed over the “GM can feed the world” argument. One submitter’s comment that it is a “cheap attempt to sway public opinion” reflected the views of others. These submitters pointed out that starvation was not due to a global food shortage, that genetically modified crops promising “miracle benefits” were proven to be rarely better than non-genetically modified varieties (possibly worse), and that leaders of developing countries themselves criticised these claims. Much intense anger (though less widespread) was also expressed over scientists and businesses getting funding and public support from claims of miracle health benefits that failed to materialise or would, at best, take many years to materialise. These submitters were outraged that proponents of genetic modification were preying on the fears of the sick and raising “false hopes” in a conscious act of deception.

Table 3.10 summarises the attitudes of submitters who commented on evidence relating to the safety of, or risks posed by, genetic modification technologies. Overall, few public submitters specifically commented on the strength of evidence around genetic modification safety and genetic modification risk. However, only a handful of those who commented believed that there is evidence that genetic modification is safe or no evidence that it poses risk. Most of those who

**Table 3.10 Existence of evidence or information about GM-safety or risk (n = 359)**

Existence of evidence or information	Number	%
<b>Evidence that GM is safe or no evidence that it poses risk</b>		
No scientific evidence/information that GM poses significant risks	11	3.1
There is scientific evidence/information that GM is predominantly safe	2	0.6
No evidence/information that GM poses risks	2	0.6
There is evidence/information that GM is predominantly safe	0	0.0
<b>Evidence is equivocal</b>	21	5.8
<b>Evidence that GM poses risk or no evidence that it is safe</b>		
There is evidence/information that GM poses significant risks	166	46.2
There is scientific evidence/information that GM poses significant risks	108	30.1
No evidence/information that GM is predominantly safe	36	10.0
No scientific evidence/information that GM is predominantly safe	13	3.6

commented believed that there is evidence that genetic modification poses risks or no evidence that it is safe. A small group believed the evidence is still equivocal. One submitter, who identified himself as a former manager at a pharmaceutical company wrote:

... the only evidence able to be adduced is from parties who have a vested interest in seeing Genetic Engineering proceed. This evidence may or may not be true and factual but it must be regarded with considerable scepticism. One of the simple facts of scientific papers and presentations is that they are heavily funded by commercial concerns and have been shown to be tainted in the past. Both the Pharmaceutical Industries and more clearly the Tobacco Industries are examples of this ... [As a former manager] I can testify to the view of a research paper being held back from publication when it does not suit the company's product objectives.

# Environmental matters

The comments of public submitters reflected their general belief that scientists’ and producers’ uncertainty about the impacts of genetic modification technologies and applications was reason enough to avoid them altogether. Uncertainty around impacts related to:

- unknown but probably negative impacts of genetic modification applications on current and potential organic farming
- impacts of non-contained genetically modified crops on other crops
- impacts of non-contained genetically modified crops on wild varieties
- general degradation of the environment from, for instance, toxins from roots of genetically modified plants washing into waterways, genetically modified crops allowing greater use of herbicides and their run-off and impact on wild plants
- unpredictable changes and imbalances through manipulation of the evolutionary process that could take years to manifest and lead to catastrophe. One quote “Make no mistake, Nature will retaliate” is typical of these submitters’ views
- risk of genetic contamination of indigenous flora and fauna.

Public submitters also commented on factors that potentially exacerbate people’s levels of anxiety because of uncertainties around the impacts of genetic modification. Factors identified by submitters included:

- non-containment of genetically modified crops
- lack of ethics in genetic modification research and development
- lack of choice faced by both other producers (such as organic producers) and the general population in areas where genetic modification applications occur.

Public submitters usually did not cite evidence to back up their concerns. When they did cite evidence, it was usually of a more anecdotal nature. Thus, a number of people cited the negative impacts of genetically modified crops on beneficial insects (such as studies on the Monarch butterfly) and birds as evidence of the unpredictable nature of genetic modification impacts. Reference was occasionally made to the book *Silent Spring* as proof of the dangers of ignoring environmental impacts of new technology. They also referred to the contamination of American and Canadian corn and canola crops by genetically modified crops, and the resulting loss of markets in Europe.

They were more likely to draw analogies from environmental disasters unrelated to genetic modification, pointing out often irreversible consequences of previously sanctioned technologies. The ecological damage caused by gorse, rabbits, possum, thar and deer were presented as evidence of the unforeseen negative impacts from introducing apparently useful, but harmful, exotic species.

Submitters also offered the uncertainty felt by others as evidence of the unacceptable risk from genetic modification. The most commonly cited evidence was the reluctance of insurance companies to insure against impacts. They interpreted this reluctance as proof of great risk and potentially disastrous consequences. “Genetic engineering is so risky that insurance companies refuse to touch it, so why should we?” was one expression of this view. Also raised, though less frequently, was scientists’ “unwillingness” to give 100% assurances of safety. This was seen to be proof of risk.

One of the strong themes in public submissions was growing public distrust in the scientific process, which they saw as unduly influenced by scientists’ funding sources. One submitter’s statement summed up wider concern:

A growing dependence on private funding means that many academics are having their research interests aligned with those of their donors. Crown Research Institutes, which are involved in genetic engineering and work closely with many universities, are required to operate as successful going concerns, and to sell their research. This means that industry is able to capture the benefits of publicly funded research and may mean that findings which are damaging to industry interests are withheld.

The perceived lack of independence of scientists means that their assurances about genetic modification safety do not lessen public anxiety. Public submitters wrote about what, in their view, were the unrealistic claims of benefit from genetic modification. One example they commonly cited was of scientists exaggerating the ability of ‘Golden Rice’ to provide the necessary daily dietary quantities of vitamin A. They also drew parallels to non-genetic modification cases (eg the tobacco, nuclear power and pharmaceutical industries) in which, they argued, scientists routinely assured the public that products were harmless.

Submitters saw reason to distrust corporate involvement in genetic modification and believed multinationals were trying to monopolise food sources. They expressed concern that companies would attempt to claim royalties from farmers who have genetically modified crops growing on their land due to uncontrollable factors such as pollen drift. Submitters often cited the landmark Canadian lawsuit in which Monsanto is suing a farmer for this very reason as indicative of how New Zealanders could lose control over their crops, farms, and home gardens.

Submitters' uncertainties about genetic modification were also heightened by their religious/ethical/values stances. Some commended the "natural balance" of ecosystems, only achievable through natural selection processes and destroyed through genetic modification. The attitudes of many submitters were summed up by one who wrote to make the point that "... any way, I like imperfection because that's what makes us what we are." Other submitters identified the Bible as evidence to back up their belief that genetic modification is wrong

More generally, public submitters were inclined to trust their own feelings and gut reactions to genetic modification. They considered these feelings to carry as much weight as any other arguments. As one submitter wrote "... genetic modification makes me feel SICK and UNEASY to the depths of my very being. It must be stopped!!" [submitter's emphasis] They felt that their own beliefs and feelings should be considered and respected by Government and the Commission. Others believed that this would not be the case and strove to provide more scientific evidence to back up their ethical and emotional stance.

## Social matters

Several submitters raised concerns about the impacts, or the uncertainties around those impacts, of genetic modification on human society. Their fears included:

- a potential (but unspecified) breakdown of society
- a general decline in morals and ethics as they are disregarded in the pursuit of profit
- the effects of genetic screening or eugenics on society (which they compared to the ethnic cleansing policies of Nazi Germany). Some people with specific medical conditions were concerned that people like them could, in the future, be genetically screened out
- the impacts of genetic modification applications on social and economic equity. For instance, some groups may be disadvantaged (or "ghettoised") by their lack of access to the benefits of genetic modification or genetic modification-free products.

## Health matters

Public submitters wrote about their unease regarding the claimed benefits from genetically modified health technologies and their concerns about the impacts of genetic modification activities (in the environment and elsewhere) and their



impacts on the health of themselves and their children. Their concerns included:

- uncertainty about the capacity of the treatments to achieve the claimed outcomes and their effects on individual health. Submitters cited evidence of genetically modified human insulin causing allergic reactions and other negative health impacts on users. Some also presented AIDS, which they attributed to vaccine work with monkeys, as evidence of negative health effects of crossing species
- uncertainty about the health effects of releasing genetically modified products into the environment. The most commonly cited area of concern was the release of genetically modified pollens and their unknown effects on asthma and other allergies. Another less frequently raised concern came from people interested in homoeopathy. They wondered whether genetic modification would alter or remove medicinal benefits of plants, either immediately or unexpectedly, in the future
- the unknown effects of exposure to genetic modification activities (including health treatments) on people's social, psychological, spiritual, cultural or ethical integrity. These effects may arise because people are opposed to genetic modification and have little choice about their exposure to it or have no control over access to it
- the unknown effects of genetic modification technologies on the health of future generations. As evidence, public submitters referred to the ongoing effects of chemical such as Agent Orange, DDT and thalidomide
- uncertainty about the impacts of genetic modification on the public health system. The level of health benefit from genetic modification-based treatments is still unknown, as are the opportunity costs of avoiding genetic modification-based treatments and the extent to which the health system may be overburdened by any negative health effects from people ingesting genetically modified food.

## Food matters

For public submitters, uncertainties associated with genetically modified food related to people's lack of choice about what they eat, the potential impacts of genetic modification on organic food production, and its impact on food safety and quality.

Consumer choice was an important issue for public submitters, and they identified several reasons why the introduction of genetic modification into food production decreased their confidence in having choices. First, the lack of food labelling

information precludes consumers in general from being able to choose what they eat. Secondly, particular groups of consumers with special need for certainty about their food composition are compromised. These include, for instance, Maori, who reject the inclusion of human genetic material in animals, Jewish and Muslim people with religious dietary restrictions and vegetarians and vegans who reject ingesting all animal products. Third, patenting of genetically modified products may restrict consumer choice by, for instance, raising the costs of some foods so that they become unaffordable.

Uncertainties around organic food production, given the unknown effects of genetic modification technologies, were also raised by public submitters. While their greatest concern was for commercial production, they were also concerned about home gardening. They felt that any genetic modification activities placed current and future production under threat, especially as cross-pollination and other potential impacts are still largely uncharted. The insertion of Brazil nut genes in soy beans and the possible contamination of genetic modification-produced tryptophan were cited as evidence of current, unanticipated risks.

With the application of genetic modification in food, uncertainty around food quality increases. Public submitters strongly defended people's rights to quality food, which they characterised as safe, nutritionally healthy, tasty and available. Several factors increase uncertainty around these components of food:

- The concept of substantial equivalence in food testing concerned a number of submitters who argued that the lack of adequate testing for those foods deemed substantially equivalent decreased consumer certainty about food safety. A number of these submitters were also concerned about a possible double standard in which genetically modified food could be both substantially different (allowing it to be patented) and substantially equivalent (allowing it on to the market with little or no testing).
- The failure of innovations like the Green Revolution and mono-cropping have increased public anxiety about the impacts of genetic modification on food quality and availability rather than assuaging it. Submitters cited the deteriorating taste of fruit and vegetables, especially tomatoes, as evidence that technological intervention often reduces food quality.
- Genetic modification activities can undermine availability of food. While scientists argue that genetically modified food has the potential to alleviate food shortages, submitters argued that shortages are as much to do with distributional problems and politics and cited difficulties in the distribution of aid in developing countries and war zones as evidence. Some also noted the negative impacts of genetically modified food production on land use in

developing countries, where subsistence farming is progressively undermined.

## Economic matters

Although public submitters were most concerned about uncertainties relating to the environment, health and food, some also raised concerns about the economy and the potentially negative impacts of genetic modification on existing and future economic activities. For the most part, they focused on organic production, particularly on the damage any application of genetic modification technologies in the environment was likely to have on commercial production. While they were concerned about current organic activity, their greatest concern was for the damage to future production. A common view amongst submitters was that the demand for organic produce overseas, especially in Europe, would continue to grow. Any release of genetically modified organisms would deny New Zealand farmers the opportunity to become certified producers and take advantage of that demand. It would also deny future workers the opportunity of employment in the organic farming sector. Their view was that organic and genetic modification production cannot coexist. Submitters referred to the landmark canola case in Saskatchewan, Canada (already mentioned) as evidence of the conflict between genetic modification applications and other farming activities.

Submitters saw a unique opportunity for New Zealand to capture a niche market in non-genetic modification and organic production. They contrasted that opportunity to a future in which New Zealand “follows the herd” and adopts genetic modification and once again finds itself in a position where it has to compete directly with larger and more productive countries. These submitters saw the opportunity to be the world’s only guaranteed supplier of pure food as too good for New Zealand to ignore.

At the same time as there is an increasing world-wide demand for organic produce, public submitters argued, there is a corresponding decline in the demand for genetically modified products. By going down the biotechnology road, New Zealand runs the risk of investing in a declining market area. As evidence, some submitters indicated their belief that America, Canada and other producers are not able to sell genetically modified products such as canola and corn.

Submitters noted that tourism continues to offer New Zealand a basis for economic diversity and growth. However, they were concerned about possible risks, as yet undefined, of genetic modification activities on that industry. One possible outcome of New Zealand’s adoption of these technologies may be damage

to indigenous flora and fauna, loss of our clean, green reputation and, therefore, our decline as a favoured destination by those seeking high environmental values. Any degradation of fish species, including exotic and indigenous species, may also affect tourism, some also believed.

Another area of uncertainty identified by public submitters related to market intelligence. Submitters pointed out our lack of knowledge about the economic impacts of New Zealand adopting or rejecting genetic modification technologies. Some wrote of mixed signals about profitability of products of genetic modification, particularly agricultural products. A few submitters questioned New Zealand's international trade relationships, asking whether we would lose our independence if genetic modification technologies were embraced. Others had the same concerns, but as a consequence of genetic modification avoidance. A few referred to former United States Ambassador Josiah Beeman's warning that we risk trade sanctions if we do not follow the of genetic modification path.

Although referred to only rarely, some public submitters also raised concerns about New Zealand's participation in, and development of, a knowledge economy. They were concerned that any rejection of genetic modification technologies could lead to a loss of expertise, as researchers and students are closed out of future technologically based economies, variously described as a knowledge economy and a technological society. Other submitters, on the other hand, saw opportunities for New Zealand to lead the world in research into organic and biodynamic forms of agriculture and holistic medicine.