Witness Brief Form 2

Royal Commission on Genetic Modification

(For Publication)

1. Name of Witness

Dr.Johannes Wirz

2. Name of "Interested Person" (on behalf of whom the Witness will appear)

Bio Dynamic Farming and Gardening Association in New Zealand (Inc)

3. Witness Brief Executive Summary

Executive Summary

Provide an overarching summary of the evidence and recommendations made [in respect of items (1) and (2) of the Warrant]. The Executive Summary should be no more than **3** pages in length

Please note that individual section summaries will be required and therefore the Executive Summary should focus on summarising the issues addressed in the brief and provide cross references to the sections in which the issues are covered rather than summarising the substantive content

Response

(1) The Bio Dynamic Farming and Gardening Association asks for a total ban of genetically modified organisms (GMOs) and products thereof from New Zealand agriculture. It considers continuous and long term monitoring, thorough and transparent labelling of GMOs and products thereof to be mandatory. In addition, persons developing and commercialising GMOs must be made liable for all adverse effects of their products, including human and animal health and welfare, environmental damage and degradation of natural habitats, as well as economic losses.

(2) The far reaching demands of the Bio Dynamic Farming and Gardening Association are substantiated by a considerable number of unexpected findings emerging from laboratory and field studies of GMOs, which all of them bear probable and serious risks for human and animal health, the ecological equilibrium of natural habitats and which may have substantial societal and economic impacts.

(3) The Bio Dynamic Farming and Gardening Association does not ask for very strict regulations of development, growth and release of GMOs because of the afore mentioned risks and impacts only, but also on the basis of a holistic understanding of life and nature, which has led to farming and production systems with unparalleled sustainability, high quality products and satisfying economic return. In these systems the important values of basic natural processes like, for example, high biodiversity and closed cycles are acknowledged, and are sought to be developed accordingly.

(4) As a consequence, the current intentions of persons looking for biotechnological methods and genetic engineering to cope with agricultural difficulties, are rejected as “silver bullet approaches” with a low potential to solve the problems in a sustainable way. On the other hand, however, organic and biodynamic farming systems have been shown to improve many of the unfavourable conditions of modern farming techniques by a contextual land management, that enhances biodiversity, soil fertility, plant and animal health, as well as it reduces soil erosion.

(5) The Bio Dynamic Farming and Gardening Association is convinced that the current world wide rejection of GMOs in agriculture and food items by the consumers is not sustained by unreasoned fear but by the insight that healthy and high quality products for human alimentation can be obtained on basis of partnership with and respect of nature, only. Thus, true public participation in questions related to the development and implementation of GMOs is required. As a result, a decent consideration of both quantitative as well as qualitative aspects of risk perception, i.e. risk assessment and risk evaluation is necessary. Whereas the former may be pursued on the basis of expert scientific knowledge, the latter has to take into consideration cultural, religious, historical and ethical aspects and thus, has to be opened to wide public debate and decision making.

Evidence by Section (as specified in the matters set out in the Warrant)

Evidence by Section

Witness briefs are to be structured in line with the matters specified in the Warrant and the sections numbered accordingly

Each section should stand alone, and include a section summary, identifying the issues addressed in the section

Witness briefs may address **all** or only **some** of the sections (as specified in the Warrant). However section numbers should be retained, for example, if a brief addresses matters (a), (c) and (e), the sections shall be numbered (a), (c), and (e), rather than a, b, and c

Witness briefs may, within each section, adopt a sub-section approach using different headings; however, each paragraph should be consecutively numbered

Section A Recommendations

The Warrant has set the Commission the task of receiving representations upon, inquiring into, investigating, and reporting on the items set out in Section A (1) and (2) below

Section A (1)

A (1) the strategic options available to enable New Zealand to address, now and in the future, genetic modification, genetically modified organisms, and products

Section A (1) Summary

No Response

A (1)

No Response

Section A (2)

A (2) any changes considered desirable to the current legislative, regulatory, policy, or institutional arrangements for addressing, in New Zealand, genetic modification, genetically modified organisms, and products
Section A (2) Summary

No Response

A (2)

No Response

Section B Relevant Matters

The Warrant has set the Commission the task of receiving representations upon, inquiring into, and investigating, the matters set out in Section B (a) – (n) below

Section B (a)

B (a) where, how, and for what purpose genetic modification, genetically modified organisms, and products are being used in New Zealand at present

Section B (a) Summary

No Response

B (a)

No Response

Section B (b)

B (b) 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

Section B (b) Summary

No Response

B (b)

No Response

Section B (c)

B (c) the risks of, and the benefits to be derived from, the use or avoidance of genetic modification, genetically modified organisms, and products in New Zealand, including:

(i) the groups of persons who are likely to be advantaged by each of those benefits

(ii) the groups of persons who are likely to be disadvantaged by each of those risks

Section B (c) Summary

Discussion of risks is integrated into discussion of the main areas of public interest, section B(j)

B (c)(i)

No Response

B (c)(ii)

No Response

Section B (d)

B (d) the international legal obligations of New Zealand in relation to genetic modification, genetically modified organisms, and products
Section B (d) Summary

No Response

B (d)

No Response

Section B (e)

B (e) the liability issues involved, or likely to be involved, now or in the future, in relation to the use, in New Zealand, of genetic modification, genetically modified organisms, and products
Section B (e) Summary

Discussion of liability is integrated into discussion of the main areas of public interest, section B(j)

B (e)

No response

Section B (f)

B (f) the intellectual property issues involved, or likely to be involved, now or in the future, in relation to the use in New Zealand of genetic modification, genetically modified organisms, and products
Section B (f) Summary

No response

B (f)

No response

Section B (g)

B (g) the Crown's responsibilities under the Treaty of Waitangi in relation to genetic modification, genetically modified organisms, and products
Section B (g) Summary

No response

B (g)

No response

Section B (h)

B (h) the global developments and issues that may influence the manner in which New Zealand may use, or limit the use of, genetic modification, genetically modified organisms, and products
Section B (h) Summary

No response

B (h)

No response

Section B (i)

B (i) the opportunities that may be open to New Zealand from the use or avoidance of genetic modification, genetically modified organisms, and products
Section B (i) Summary

Discussion of opportunities is integrated into discussion of the main areas of public interest, section B(j)

B (i)

No response

Section B (j)

B (j) the main areas of public interest in genetic modification, genetically modified organisms, and products, including those related to: **(i)** human health (including biomedical, food safety, and consumer choice) **(ii)** environmental matters (including biodiversity, biosecurity issues, and the health of ecosystems) **(iii)** economic matters (including research and innovation, business development, primary production, and exports) **(iv)** cultural and ethical concerns
Section B (j) Summary

(6) I would like to present evidence for a number of serious questions and problems related to genetically modified organisms (GMOs) and their deliberate release, with respect to human health, as well as environmental and ecological issues. The complexity of the observations and results to be presented reveals how far we are from a thorough understanding of behaviour of GMOs and their interaction with agricultural and natural habitats. Given this complexity, one may wonder where the rush to exploit GMOs originates from and whether there exist more adapted measures to face the challenges of the present time agriculture. This paper will show that such do exist. Finally, the visions of a future agriculture should not be discussed from a purely technology oriented view. I propose to consider agriculture

as a cultural task and therefore to look for a pluralistic and participatory base of debate and decision-making, including all possible stakeholders.

(7) In the first part there will be a short and incomplete description of risks and problems emerging from the growing of genetically modified plants. It should be noted that it is premature to draw definitive conclusions from these examples. However, they suggest one should follow to the largest extent principles of utmost precaution, especially since none of the many issues have apparently been anticipated in the dawn of genetic engineering.

Risks

The risks of genetic modification can be subdivided into three categories and require adapted methods of assessment and evaluation

B (j)(i)

1st Category: Risks for human health

(8) Despite of frequent claims by biotech companies, GMOs and products thereof cannot be considered to be substantially equivalent to their non-manipulated parents. As experiments on rats have shown (Ewen & Pusztai 1999) the genetic manipulation can result in an unpredictable change of the composition of food products with severe adverse effects, which have not been anticipated. The results have shown to be untrue the naive belief that adding one gene equals the addition of just one new protein. Since, in general, the site of integration of a foreign gene into the host genome cannot be directed, every single new construct has to be examined thoroughly for substantial equivalence and possible adverse health effects. However, negative results in laboratory animals like rats do not necessarily exclude detrimental effects in man. Therefore thorough and continuous monitoring of the human populations is required, in the case of commercialisation of transgenic crops or products thereof.

(9) As the debate on AgrEvo's Cry9C-Bt-corn has shown, products from genetically modified plants pose a certain allergenic risk (Bucchini & Goldburg 2000). The recent scandal and subsequent withdrawal of contaminated food items in the US show the difficulty of preventing unauthorized food ingredients entering into the food processing chain.

(10) Another important issue is the horizontal gene transfer of antibiotic resistance genes. These genes are used as markers in the process of genetic modification. Although it is generally accepted that sequences can be transferred from genetically modified plants and bacteria to non-target microorganisms, the probability of such an event is controversial. However, a report from the UK governmental Advisory Committee on Novel Foods and Processes (ACNFP), issued in February 1999 but brought to public awareness only in September 2000 (Koechlin 2000), is warning about the use of genetically modified cotton for the production of napkins and tampons. Traces of antibiotic gene sequences could be taken up by the pathogenic

bacteria *N. gonorrhoea*, which are propagated by body fluids and mucosa, and thus render infections like gonorrhoea untreatable.

(11) Finally, studies show (Séralini 1998) that the usage of herbicides correlates with an increased risk for different kinds of cancer. Since herbicide resistance is still one of the major traits genetically engineered into crop plants, the use of such agents is likely to increase in the future with adverse effects for producers and consumers.

(12) These examples show that the situation concerning health risks of genetically modified organisms is far from being safe and settled. Therefore, should genetically modified organisms and products thereof be sold to consumers, careful risk assessment and evaluation, the guarantee of free choice and consequently clear and unambiguous labelling of products would be required. In addition, the liability of the genetic modifiers should to be extended over the whole period of development and commercial exploitation of such products.

B (j)(ii)

2nd Category: Ecological risks

(13) The spectrum of problems and risks posed by deliberate release of genetically modified plants is extraordinary. Herbicide resistance in weedy plants has been reported in many cases (Meyer 2000), crop rotation after growing herbicide resistant oilseed rape is severely aggravated because of growth from seeds that have remained in the field during harvest. These plants cannot be removed with herbicides (Meyer 2000a). Horizontal gene transfer of antibiotic resistance genes from oil seed rape to bacteria in the intestine of bees has been reported (uj 2000). It is likely that these sequences will be ingested during the consumption of honey. Whether they can be transmitted to bacteria in the human gut remains to be seen. If so, this transmission would add to the world wide antibiotic resistance problem. A recent study indicates that a reduction of biodiversity due to herbicide resistant plants seems to be likely (Watkinson, A.R. et al. 2000) and investigations have been reported showing that the repeated use of herbicide resistant crop plants results in a shift in the composition of the weed flora in the fields (Meyer 2000a).

(14) The use crop plants carrying a gene sequence for Bt-toxin can have severe consequences: Larvae of non target insects like the monarch butterfly (Losey et al. 1999; Hansen Jesse & Obrycki 2000) are severely affected if they feed on milk weed plants painted with pollen of Bt-toxin corn in laboratory experiments or if they are bred on plants, which had been collected in the vicinity of Bt-toxin maize fields.

(15) A recent study has reported that, unexpectedly, Bt-toxin from roots of transgenic corn leaks into the soil (Saxena et al. 1999). This finding is even more troublesome since the biological activity of the toxin persists for longer than 100 days after removal of the plants due to binding to soil particles, and thus may negatively effect or even kill beneficial non target insects in the soil.

(16) All the cases presented here indicate that we are far from an understanding of the complex behaviour and the interactions of genetically modified crops with the natural habitats. Again, the results make careful and long-term risk assessment studies mandatory before commercialisation and production on a large scale. In addition, it should be investigated to what extent and at what rate the negative effects in these habitats revert to the original state, after the cultivation of genetically engineered crops has been stopped.

(17) If one considers what measures have to be taken in order to grow certain varieties of transgenic crops, it seems to be justified to question the biotechnological approach on a fundamental level. In case of the production of transgenic cotton and corn, the US EPA demands the cultivation of non-modified plants as refugee for target insects (Meyer 2000b) in order to slow down the processes of adaptation and natural selection of detrimental insects like boll worm and corn borer. In the case of corn the EPA requires growing of non modified varieties on 20% of the acreage; for corn in cotton areas a proportion of 50% is required. These recommendations, although praised as integral pest management, clearly indicate the modest contribution or even failure of transgenic Bt-toxin crop plants for a sustainable agriculture. Does not this fact, taken together with the wide spectrum of possible risks and unexpected findings presented above, call for true sustainable production systems like the ones successfully developed and practised by organic and biodynamic agriculture?

B (j)(iii)

3rd Category:Economic and societal impacts:

(18) Herbicide and pesticide resistant crops are heralded by the biotech industries to increase yields and to reduce the use of herbicide and pesticides. Investigations by independent institutions show however, that theses promises do not hold (Tappeser 1999). Although true for some regions, there are cases where not only the yields were lower compared to conventional crops but also the input of plant protection agents is higher for transgenic than for conventional crops. Often, genetically modified plants do not pay off. Together with their growing rejection by the consumers, the acreage of cultivation of transgenic corn and cotton in the US are likely to decrease from 55% to 48% and from 33% to 25% in the year 2001, respectively (Meyer 2000c).

(19) Under these circumstances one would expect a careful and responsible consideration of the use and the value of transgenic crops. However, the opposite seems to be true. Genetically modified organisms are aggressively exported, mainly from the US and have already proven their potential to destroy local markets, for example on the Phillipines (Meyer 2000d). A similar situation could occur in New Zealand itself. Organic and biodynamic standards prohibit the use of genetically modified organisms. Since hybridisation and out crossing of transgenic crop plants with non modified varieties in the vicinity is sure to happen, organic and biodynamic farmers will end up growing products that no longer fulfil the basic regulations of GMO free production. Little is known about the probability of hybridisation. Minimal distances from fields with transgenic cultivars to those with non modified varieties

have been proposed, but it is an open question to what extent they cope with the real situation. For example, pollen from transgenic oil seed rape has been fertilising non-modified plants in fields four kilometres away. Thus, organic and biodynamic markets risk being destroyed. Deliberate release and commercial growth of transgenic crops should not be considered as long as the issues of genetic contamination are not thoroughly settled and regulated. Threshold values of contamination must not only face technological aspects but also societal requirements. Informed and open debates among the different stakeholders should precede any decisions on limits of contamination.

Liability

(20) The present legal situation is bizarre. The regulatory system, in particular in the US, is promoting the development, the commercialisation and the deliberate release of genetically modified plants and supplements for animals, like growth hormone, tremendously. On the other hand, the problem of liability remains elusive. The insurance industry refuses to write policies covering liability from harm caused by genetically modified organisms (Meyer 2000e). And in the UK, the Farm Insurance Company has called the cross pollination from genetically modified to non-modified crops an uninsurable risk (Meyer 2000f). The argumentation says that such a liability cannot be covered, whether the crop is genetically modified or not. On the basis of the aforementioned unexpected observations and problems related to the genetically engineered plants, the presupposition, that GMOs and non-manipulated plants do not need to be distinguished, is strongly flawed.

(21) Who is liable to cover eventual damages created by genetically modified organisms? It is wrong to privatise profits from GMOs through direct marketing or license fees, but at the same time to socialise or externalise the costs of possible damages. It is unethical to charge individual farmers in case of environmental or ecological damage.

(22) It should be noticed that the lack of regulation of liability will affect all the farmers from the organic and biodynamic sector, and many producers in conventional agriculture, who have decided to keep their production free from GMOs.

(23) Regulations that intend uncoupled profits from liability must be considered to be highly irresponsible and unethical. They ought to be discussed and decided upon by all the parties affected: producers, food processors, retailers and consumers.

Returns of sustainable agriculture

(24) All commercially grown transgenic crops are either resistant to herbicides and/or to insect pests. Even if we assume that the research and development of genetically engineered plants are not driven by economic reasons exclusively, it cannot be denied, however, that they are trying to counterbalance gross errors of an industrialised agriculture. The one-sidedness of a particular production system – monocultures, lack of crop rotation, low genetic variety of crop plants etc. – is the cause of problems that are sought to be overcome by genetic engineering. It cannot

be overlooked that the molecular genetic approach stems from the very same one-sidedness in the sense that its attempts are symptomatic and do not remove one of the causes that have created the actual problems in agriculture.

(25) This is not the place to outline the paradigmatic and ideological background of modern agriculture. But it should be noticed that organic and biodynamic agriculture has set out from an entirely different inner attitude. Basically, the notion of man being the master of nature (as a characterisation of industrialised agriculture) has been replaced by that of man being the participant (Kockelkoren 1995). As a consequence, some of nature's basic principles have been developed into guidelines for these production systems. They aim for high biodiversity, develop closed production cycles and implement sustainability and process oriented management.

(26) Indeed, this type of agriculture has proven its success with respect to many pertinent issues related to sustainability: Soil fertility is maintained or even enhanced (Mäder et al. 1996), soil erosion is reduced (Tilman 1998), nitrogen losses are minimised (Davidson et al. 1996, Drinkwater et al. 1998) and crop strength is enhanced by genetic diversity (Wolfe 2000, Zhu 2000), just to name a few examples.

(27) Organic and biodynamic agriculture are pursuing what can be called a contextual approach. For example, the corn borer in maize is not really a pest but expression of unbalanced condition in the field. Accordingly, solutions are envisaged that do not primarily aim at the reduction of the noxious animal. Instead one attempts to improve the cultivation processes, and thus to strengthen the crop plant and its habitat. A very nice piece of work has been presented by the ICEPE in Nairobi (Meyer 2000g), where the corn borer is regulated by a "push-pull" approach. Leguminosa under-sown in the field push the insect away and improve the fertility of the soil by biological nitrogen fixation. In the field margins grass is grown, which attracts (pull) the animals for egg deposition, but at the same time reduces the vitality of the insect larvae. In addition, the grass provides an excellent animal fodder. This example shows first that contextual approaches provide efficient and sustainable solutions of agricultural problems and second that they are likely to be the methods of choice in the Third World.

(28) In conclusion, organic and biodynamic farming systems represent successful alternatives to highly industrialised production systems. They do not only fight symptoms of current agronomic problems but reduce and transform their causes. Genetically modified organisms put these approaches at risk. Given the uncertainties of GMOs, the high societal esteem for natural high quality alimentary products calls for an adoption of a policy that restricts the former and stimulates the latter.

B (j)(iv)

Genetically modified organisms and public awareness

(29) Genetically modified organisms cannot be assessed on the basis of agronomic and technological challenges and risks only. They present societal and political issues of the same extent. Therefore, debates and decision-making processes should include the participation of all stakeholders: scientists, producers, food processors, retailers and consumers. Experiences from Europe have shown such panels to stimulate the integration of a wide spectrum of focal points. In particular, a shift from risk assessment to risk evaluation has been observed. The former usually deals with quantifiable parameters and mathematical models of probability calculus. The latter takes into account the perception of risks, their individual and societal evaluation and – and often unconscious – presuppositions with respect to ethical, cultural and religious values. Risk assessment and evaluation do not necessarily coincide, as is shown for example by car driving. The high probability of suffering from a severe accident does not prevent a majority of people in western populations from driving a car.

(30) Thus, whereas risk assessment must be performed with professional, scientific expertise, risk evaluation must be considered to be a societal and cultural task, taking into account the respective individual and societal images and values of nature, crop plants, food items, production processes, as well as ethical considerations about the intrinsic value and integrity of living beings.

(31) The public debate in Europe has revealed beyond any doubt that the rejection of GMOs from the consumer side is not guided by mere fear from possible adverse effects for human health and environmental damage. Although, they may prevail in some cases, rejection is equally based on the insight that healthy and high quality products are intimately connected to sound and sustainable production processes, which are governed by respect of and partnership with nature. Directions and visions in the agriculture of tomorrow need to acknowledge ethical and cultural inputs as much as technology driven considerations.

Section B (k)

B (k) the key strategic issues drawing on ethical, cultural, environmental, social, and economic risks and benefits arising from the use of genetic modification, genetically modified organisms, and products
Section B (k) Summary

Discussion of strategic issues is integrated into discussion of the main areas of public interest, section B(j)

B (k)

No response

Section B (l)

B (l) the international implications, in relation to both New Zealand's binding international obligations and New Zealand's foreign and trade policy, of any measures that New Zealand

might take with regard to genetic modification, genetically modified organisms, and products, including the costs and risks associated with particular options
Section B (l) Summary

No response

B (l)

No response

Section B (m)

B (m) the range of strategic outcomes for the future application or avoidance of genetic modification, genetically modified organisms, and products in New Zealand
Section B (m) Summary

No response

B (m)

No response

Section B (n)

B (n) whether the statutory and regulatory processes controlling genetic modification, genetically modified organisms, and products in New Zealand are adequate to address the strategic outcomes that, in your opinion, are desirable, and whether any legislative, regulatory, policy, or other changes are needed to enable New Zealand to achieve these outcomes
Section B (n) Summary

No response

B (n)

No response

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