PSGR

Physicians and Scientists for Global Responsibility

Charitable Trust

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OPEN LETTER TO GOVERNMENT

From the Trustees, Members, Associate Members and Supporters of Physicians and Scientists for Global Responsibility New Zealand Charitable Trust

Genetic Engineering and New Zealand

We write in support of the majority of New Zealanders concerned about genetic engineering and its applications in New Zealand. It is a technology we have closely monitored since the late 1990s.

We are cognisant of the important advances made in biotechnology adding to the value to our scientific heritage, including those made by New Zealand scientists. However, the application of genetic engineering biotechnology, in particular the release overseas into the environment of genetically engineered organisms, has proven at best uncertain and at worst seriously damaging. We maintain that it is imperative to keep genetic engineering biotechnology in strict containment in the laboratory.

For the reasons detailed in this letter we call for government to instigate a moratorium on any further release into the environment and food chain of genetically engineered organisms given:

- Proven negative outcomes identified in the use of GE organisms overseas, which New Zealand can and must avoid
- Potential for catastrophic disruption of complex natural systems in the longer term
- Evidence in animal tests of harm from consumption of GE foods, including impacts on reproduction, internal organs and tissue damage, in some cases involving GE products that are already entering the human food chain
- The absence of credible independent testing of GE foods prior to their entry into the human food chain
- The absence of research and monitoring of the impact of GE foods on public health
- The potential for harm from consuming GE foods, particularly amongst infants, pregnant women, the elderly and those with weakened immune systems
- The unique importance to New Zealand of sustaining the integrity of the environment and ‘clean green’ reputation of the food production system, which underpin the economic value of our tourism and exports

Background

Recent government decisions raise concerns in respect of how far down the GE road New Zealand will go, and the subsequent cost to human and environmental health, to the public purse, and to other advances in science when funding is focussed on genetic engineering biotechnology. Because policy decisions have been dictated by vested interests, New Zealand has already lost its world-renowned DSIRs and the Bioethics Council. It now seems that the flawed and inadequate oversight currently provided by the Environmental Risk Management Authority, is at risk of being further undermined in the operation of the new EPA.

It has become obvious that a blinkered approach to genetic engineering biotechnology, and the commercial imperatives driving it, mean that the generally acknowledged risks are not being properly addressed and that this is only the tip of an iceberg. The downstream effects of releasing genetically engineered organisms into the environment or the food chain, as revealed to date, have raised concerns with many of the world's most eminent scientists, including Nobel Laureates. Beyond the problems already identified but being ignored by authorities under commercial pressure, are undiscovered effects which may take decades to become apparent.

New Zealand does not have, but urgently needs, a truly independent and transparent regulatory authority, with access to independent scientific advice. It must give credence to unquantified risk and take into account the economic realities related to the release of genetically engineered organisms.

The incentives that have driven genetic engineering are focussed on vested commercial interests and short term gain, without sufficient regard to societal or long-term impacts. Most pro-GE companies are among the biggest and most powerful in the world. Their economies rival, even exceed, those of some nation states, like New Zealand. This power enables them to extend their influence over research, regulatory, media and political institutions, and New Zealand has not been immune to this as evidenced by the liberal approach taken by FSANZ in approving scores of imported GE food products for sale in Australia and New Zealand.

Transnationals hold intellectual property rights over much of the world's industrial and technological production, including property rights in biology and thereby the world's food supply. Fortunately, on 29 October 2010, the US federal government reversed a longstanding policy when it announced that "the chemical structure of native human genes is a product of nature, and it is no less a product of nature when that structure is 'isolated' from its natural environment than are cotton fibres that have been separated from cotton seeds or coal that has been extracted from the earth. We acknowledge that this conclusion is contrary to the longstanding practice of the Patent and Trademark Office, as well as the practice of the National Institutes of Health and other government agencies that have in the past sought and obtained patents for isolated genomic DNA."

The fact that agencies with vested interests have been able to patent genomic DNA has seriously restricted research. An example is the US patents for the breast and ovarian cancer-predisposing gene BRCA1. Valuable research projects have been abandoned because of the costs involved in accessing patented DNA.

Agriculture

The commercial production of transgenic crops occurs in uncontrolled conditions - the open environment. They pose bio-security and health risks with the potential for unpredictable downstream effects. The risks are judged so uncertain that developers/producers and insurance companies refuse to cover them.

In the past, the approach taken in national legislation has been to 'socialise' those risks, i.e. to pass the risks and costs they represent onto the people of New Zealand. We can draw a parallel with mining, rabbits and possums where accountability has fallen on the public purse.

The socialising of risk is the approach currently embodied in the Hazardous Substances and New Organisms (HSNO) Act. This effectively enforces on the public, regional and local government and their ratepayers the responsibility to cover the costs of damage from GE organisms. This effectively creates a public subsidy for risky ventures by private-interest commercial organisations, in a way that offends most New Zealanders. It is an approach they consider unreasonable (based on the independent research by Colmar Brunton commissioned by Councils in Auckland and Northland, and provided to central government as support for legislative change to HSNO).

New Zealand's economy is uniquely vulnerable to the loss of agricultural export and tourism markets. Any release of genetically engineered organisms would put those same markets directly at risk. Our economy is very reliant on agriculture, horticulture, forestry and fisheries. It is, therefore, significant that the adoption of genetic engineering biotechnology in agriculture has over the last decade lead to some of the largest reductions in agricultural export markets internationally; e.g. Canadian canola and honey, US maize and Argentinean soy. Brazil increased its soy exports because it has remained GE free; likewise, Australia earning export orders for GE free canola.

Adverse impacts from genetic engineering on agriculture and agricultural markets - even without mishaps - could be compared to the effects of a bio-security disaster such as Foot and Mouth disease experienced by the UK or bird flu on fowl species throughout Asia and Europe.

Commercial plantings in the US and elsewhere have contaminated weed species with herbicide-resistant genes and the weeds can no longer be eradicated easily. Transgenes have also contaminated conventional and organic crops.

In the context of patented DNA, licence fees and enforcement of 'ownership' (as evidenced by the case of Monsanto against Percy Schmeiser in Canada), the growing of transgenic crops means farmers must pay a royalty fee, making seed more expensive; and the traditional practice of saving seed for the following season is prohibited.

Overseas, the impact has caused hardship to farmers, many losing their livelihood. In India, farmers have gone into debt and even mortgaged their farms to purchase transgenic seeds, pesticides, and fertilizer from largely US companies on the promise of increased yields. When the yields do not arise, they are left so in debt that many have committed suicide. According to the Indian National Crime Records Bureau, over 182,900 farmers took their own lives between 1997 and 2007, an estimated average of 46 every day, which equates roughly to one every 30 minutes. In an effort to raise awareness to this tragedy, a film has been made featuring Bollywood star, Aamir Khan.

The Threat to New Zealand

Of particular concern in New Zealand are:

GE Trees:
*****The experiments of the New Zealand Forest Research Institute Limited, trading as Scion, planting *pinus radiata* with a number of engineered traits, including herbicide-resistance and using terminator-type technology

> (Applications GMF000032; GMF000033; GMF000034; GMF000035; GMF000036; GMF000037; GMF000038; GMF000039 are all approved with controls. www.ermanz.govt.nz/

In respect of herbicide-resistant genes being engineered into trees, herbicide-tolerant transgenic crops in the US have increased the use of herbicides, rather than reduce usage. This has caused a substantial number of weed species to become herbicide-resistant, sometimes to multiple herbicides, causing major difficulties for farmers and other growers.

This is of particular concern for New Zealand given we already suffer the effects of conventional wilding pines, and it indicates that future use of herbicide-resistant GE pines will cause even greater problems.

Scion proposes trees be engineered using 'terminator-type' technology, making the trees sterile, not able to flower or replicate. Transgenic traits tend to be unstable and the variants of terminator technology offer no absolute guarantee of sterility. The traits can break down and the trees revert to flowering. Even if totally sterile, terminator trees can spread genes by asexual means. Genes can spread horizontally in soil bacteria, fungi and other organisms in the extensive root system of forest trees. In the long term there could be impacts on the soil biota and fertility. Sterile monocultures are known to yield more readily to disease.

Trees that do not flower or fruit cannot provide food for the organisms that feed on pollen, nectar, seed and fruit; thus, essential pollinating insects may not be available especially for beekeepers and horticulturalists in the vicinity of GE pine plantations. Any exacerbation of the problem of declining bee populations which is of particular note overseas would harm food production and food security.

The trees are scheduled to be trialled over two decades in the open environment in the Rotorua area in what is claimed to be "containment". Many studies have proven the ability of pollen to travel and we particularly refer to Singh el al (1993) who found pine tree pollen had travelled over 600 kms. Pollen grains are of size 100 to 10 microns or smaller. Once in the atmosphere, these grains can travel vast distances. It would need a failure rate of only a small part of a percent for transgenes in pollen to contaminate other trees, potentially at great distances, in ways that could not easily be monitored.

> Singh, G et al., 'Pollen-Rain from Vegetation of Northwest India,' *New Physiologist*, 72, 1993, pp. 191-206.

The risks are environmental and economic.

Risks are reflected in the announcement this month by the New Zealand Company, Rubicon Limited, that the developer, ArborGen LLC – a partner with Rubicon and the International Paper Company of MeadWestvaco Corporation - postponed plans to sell shares on the NASDAQ

exchange. One reason given was that it had not received regulatory approval to market transgenic trees. ArborGen had hoped for a price on carbon to increase timber demand and this has not arrived. Another potential market, biofuels derived from transgenic trees, has not eventuated because the manufacturing processes have proven slow and difficult to develop; a past associate of ArborGen, Range Fuels, closed its cellulosic fuel refinery this year. It was also reported that, to date, ArborGen has failed to make a profit.

New Zealand has a profitable forestry industry that has developed over 150 years using selective breeding. It is substantially dependent on *pinus radiata*. Forestry is a major export earner and a significant employer. Terminator technology has attracted a voluntary moratorium from most countries because of the implications of its use. The effect on this country's reputation overseas and exports could be very damaging. These experiments are not in New Zealand's best interests.

> www.psgr.org.nz/index.php?option=com_content&view=article&id=80:submission-on-application-erma200479-to-field-test-in-containment-pinus-radiata&catid=24:environmental-risk-management&Itemid=39.
> ERMA decision: www.ermanz.govt.nz/find/WebResults.aspx?search=GMF99001+&submit.x=30&submit.y=16

"Pharming"- Animals as Bio-reactors:

There is significant cause for worry about AgResearch's poorly reasoned experiments on a range of organisms, especially in the light of the CRI's established history of inadequate management and poor results.

Producing pharmaceuticals using animals and crops has not proven lucrative despite more than a decade of experimentation. Now AgResearch proposes research involving many different animals and organisms, and a range of undeclared or unknown genetic constructs, for the general purpose of research, breeding and production of commercial products such as antigens, enzymes, biopharmaceuticals and hormones for commercial release.

AgResearch contends that its current containment facilities are insufficient and it has proposed using centres for larger animals sited in either the North or South Islands and remaining operational over indefinite periods of time. "Containment" may simply mean fencing.

PSGR still contends that AgResearch has failed adequately to meet relevant sections of HSNO legislation and therefore the basis of ERMA's statutory obligations under the HSNO Act, and that deliberate exclusion of information has prevented ERMA from making an adequately informed evaluation of risks to public health from transgenic livestock maintained or produced as a consequence of AgResearch's experiments.

Also of concern is the handling of experimental stock at undisclosed sites: for example, disposal of carcases and animal waste and their effect on soil organisms, and on ground water and run off. It is said waste materials from transgenic livestock operations will be disposed of off-site; 'off-site' being taken to mean 'not in containment' under HSNO. It also means undisclosed geographic locations and, consequentially, unknown interactions with the receiving environments.

The spraying of GE animal waste onto fields is also a clear channel of risk that is to go unmonitored under ERMA's current approvals.

The inefficient monitoring and control of transgenic plants in containment:

Transgenic *Brassica* cultivars have been allowed to flower in field trials at The New Zealand Institute for Plant and Food Research Limited (formerly Crop & Food) making it inevitable that transgenic pollen would escape. One cannot assume that there was no contamination of non-transgenic *Brassica* crops or Brassicaceae weeds with transgenic pollen, and that transgenic hybrid seed set may have occurred.

A submission to MAF by Stuart Gowers, forage brassica breeder from the former Crop and Food Research, Lincoln, describes *Brassica* species as being highly promiscuous, with crosses occurring readily between all species within the genus either directly or via an intermediary. Cross-pollination will occur within each species and between species of *B.campestris, B. napus, B.oleracea, B. nigra,* and *B. juncea.*

Novel *Brassicae* should be subjected to feeding tests. Mice fed transgenic peas, engineered with a gene from the closely related common bean, were shown to have immunological damage, evident in their lungs (Prescott *et al.*, 2005). The authors of the study said diversity in translational and post-translational modification pathways between species could potentially lead to discrete changes in the molecular architecture of the expressed protein and subsequent cellular function and antigenicity. They showed that transgenic expression of a plant protein (amylase inhibitor-1) from the common bean (*Phaseolus vulgari*) in a non-native host i.e., the transgenic pea (*Pisum sativum*), led to the synthesis of a structurally modified form of this inhibitor. They also showed that the consumption of the modified inhibitor as compared with its native form caused an antigen-specific (CD4+ Th2-type) inflammation in the lungs of mice. The transgenic brassica is engineered with a highly modified, synthetic version of a bacterial gene and the ramifications of post-translational modifications should be researched.

Scant attention is given to pleiotropic effects; unexpected secondary effects of a genetic change. When Saxena and Stotzky (2001) studied *Bt* corn engineered to produce the Cry1Ab protein to kill lepidopteran pests, the *Bt* corn acquired very much higher levels of lignin; a pleiotropic effect. Professor David Williams, a New Zealander undertaking medical genetic engineering research at the San Diego School of Medicine, California, said: "I'm afraid that most of us who work with transgenics are pretty uncritical. Most of us assay for the transgenic product and ignore the secondary effects. Even those people doing functional genomics on transgenics mostly ignore changes that 'don't make sense', i.e., cannot be seen as immediately attributable to the transgene. Hence it's hard to get an idea of the extent and prevalence of downstream effects from insertional mutagenesis and simply imbalances cause by transgene expression. The biggest risk is that we don't know. The problem with transgenics that are released into the environment and used in the food supply, however, is that the potential consequences of deleterious unknowns are clearly greater." In private correspondence with PSGR Trustee, Dr Elvira Dommisse, Professor Williams forwarded a paper on insertional mutagenesis of transgenic *Arabidopsis thaliana*, a member of the Brassicaceae. Precise locations of insertional mutations were determined for more than 88,000 T-DNA insertions, which resulted in the identification of mutations in more than 21,700 of the approx. 29,454 predicted *Arabidopsis* genes (Alonso *et al.*, 2003).

Brassica experiments at Plant and Food Research (formerly Crop & Food) have been running for almost three decades and give no indication of producing high performing, commercially viable cultivars becoming available. We should be cognisant of the costs of such long term, unproductive research. In 30 years, a breeder could have produced some very good commercial brassica cultivars by using classical and DNA marker-assisted (non-transgenic) breeding techniques, cultivars that would be readily accepted, grown and eaten by the public and provide income for the breeder.

Control, containment and contamination

Recombinant DNA can be detected for several months in soil after the deposition of litter from transgenic plants (Meier and Wackernagel 2003).

In the US, unmilled and milled wheat samples have been found contaminated by transgenic soy and transgenic corn. Co-mingling of conventional corn with the transgenic StarLink variety, not approved for human consumption because of the risk of adverse health effects in consumers, exemplifies the risk of approving GE feed-crops for animals that are not fit for humans but become co-mingled and enter the food chain. Repeated failures in efforts to segregate such crops are alarming and need urgent action. The US Department of Agriculture acknowledges it may never be able to eradicate the StarLink Cry9C gene from the food chain. Most recently FSANZ has approved a form of GE corn that is high in lysine. This is intended for animals but when heated can create harmful compounds linked to serious human disease. The approval acknowledges that the hi-lysine corn could enter the human food chain accidentally, yet evidence of the potential harm when cooked and consumed by people has gone ignored.

Canola pollen can travel considerable distances (Rieger *et al* 2002; *Science*, 28 June 2002). Chemical and DNA tests have verified the existence of transgenic canola volunteers (wild plants) resistant to three agricultural chemicals: Roundup, Liberty and Pursuit. When Tasmania ran trials of transgenic canola, transgenes escaped at 11 of the trial sites, despite stringent controls.

The Canadian honey industry lost virtually all its export markets because of contamination by proteins of transgenic origin (Smyth *et al*., 2002). British bee keepers experienced contamination from field trials of transgenic crops. Transgenic crops in New Zealand would threaten our multi-million dollar honey export industry and the damage would be irreversible.

Horizontal gene transfer is natural within a species and sometimes between related species. It is not common between unrelated species. Novel transgenes can be introduced to other plants and theoretically to bacteria. Concern arises because developers have genetically engineered crops to produce pharmaceuticals, vaccines, industrial compounds, and more. The most frequently used crops are human food crops such as corn. Corn is highly susceptible to contamination because it relies on pollen from other corn plants for fertilization.

US farmers and organic growers report that their suppliers can no longer guarantee seed that is GE-free. In New Zealand, retailers report that it is increasingly difficult to obtain GE-free or organic soybeans for their customers.

New Zealand is unique in that it has the opportunity to apply caution, maintain control and prevent contamination. We do not have to plant or experiment with transgenic crops. We can protect our environment, our health and our export markets, even take advantage of the demand for GE free product. The global demand for GE-free, organic, low-pesticide-residue and ethically-produced food is strong in New Zealand's primary export markets.

Biopharmaceuticals

Producing drugs in the laboratory using genetic engineering technology has not proven itself 100% reliable.

TGN1412 threatened severe allergic (anaphylactic) reactions on human volunteers who suffered varying degrees of long term adverse effects, including a New Zealand volunteer. A Foot and Mouth outbreak in Surrey, England, was linked to a transgenic vaccine under research at the Pirbright/Merial Animal Health research farm. Humalin is declared a success, yet the British Diabetics Association claims some 20% of insulin-users have adverse side effects with this genetically engineered human insulin, some serious or fatal.

The Johnson & Johnson drug, Eprex, is a version of a protein known generically as erythropoietin, or EPO. Bioengineered erythropoietin is made by splicing the human EPO gene into hamster cells. This novel EPO is subtly different from the natural protein and in patients with red cell aplasia antibodies treated the drug as a foreign protein and did the same to the patient's natural EPO. In a study of 522 subjects, patients were given relatively high doses of Eprex for three days or a placebo; most were not anaemic. Sixteen percent of those treated with Eprex had died three months after the study began, compared with nine percent who were given a placebo.

Human health and transgenic food

Proponents claim that transgenic foods have been eaten by millions of people worldwide for over 15 years with no reports of ill effects. There have, however, been no epidemiological studies to determine whether engineered crops have or have not caused harm to consumers.

The British Medical Association journal, *The Lancet*, reported that rats fed on potatoes genetically engineered with the snowdrop lectin had unusual changes to their gut tissue when compared with rats fed on non modified potatoes.

> Ewen SW, Pusztai A (October 1999). "Effect of diets containing genetically modified potatoes expressing Galanthus nivalis lectin on rat small intestine". *Lancet* **354** (9187): 1353–4. doi:10.1016/S0140-6736(98)05860-7. PMID 10533866.

Studies have found DNA from M13 virus, GFP and even ribulose-1,5-bisphosphate carboxylase (Rubisco) genes in the blood and tissue of ingesting animals.

> Brigulla, Matthias (2010) Molecular aspects of gene transfer and foreign DNA acquisition in prokaryotes with regard to safety issues. Applied Microbiology and Biotechnology).
> Guertler, Patrick (2009) Sensitive and highly specific quantitative real-time PCR and ELISA for recording a potential transfer of novel DNA and Cry1Ab protein from feed into bovine milk. Analytical and Bioanalytical Chemistry

A gene from rapeseed (canola/oilseed rape) engineered to resist the herbicide glufosinate has been found in bacteria and fungi in the gut of honeybees. The sole human feeding study looking at the ingestion of transgenic soy involved seven volunteers. Soy-derived transgenes were transferred into the bacteria living in their gut.

> Netherwood *et al.*, "Assessing the survival of transgenic planic plant DNA in the human gastrointestinal tract," Nature Biotechnology 22 (2004):2.

Lowering the intake of agricultural chemicals should be a priority. In Israel, after banning just three agri-chemicals, the death rate from breast cancer in pre-menopausal women declined by 34% between 1976 and 1986. Roundup is linked to a 3-fold increase in neuro-developmental (attention deficit) disorders (EHP Supplement 3, Vol. 110, June 2002) and a recent test-tube study revealed that Roundup can severely reduce the ability of mouse cells to produce hormones and interferes with a fundamental protein called StAR (steroidogenic acute regulatory protein). The StAR protein is key to the production of testosterone in men, and the production of adrenal hormone, carbohydrate metabolism and immune system function. The researchers point out that "a disruption of the StAR protein may underlie many of the toxic effects of environmental pollutants." (EHP Vol. 108, No8, August 2000.) Exposure to *Bt* spray can produce skin sensitisation and induction of IgE and IgG antibodies to the spray. Mice, exposed to a Bt strain that can cause severe human tissue death, died within eight hours from clinical toxic-shock syndrome.

There are no definitive studies on how human consumers are affected by the Bt toxin which is synthesised in every tissue of GE plants made to produce the toxin. Nor are there definitive studies on the effects of glyphosate, the active ingredient in the herbicide Roundup, glyphosinate or other herbicides applied to crops engineered for resistance to them. Before food derived from RoundupReady crops was approved for sale in New Zealand, regulatory authorities increased 200-fold the amount of residual glyphosate allowed.

We do not know how ingesting multiple genetically engineered foods on a daily basis will affect human health in the short or long term. GE foods have been introduced into the food chain without adequate testing and there have been no proper epidemiological studies to investigate their consequent effects.

Exports, economics and ethics

The transnationals who largely developed various genetic engineered products have walked away from them when problems have appeared. In 2008, Monsanto sold its controversial POSILAC bovine somatotropin brand (rBGH). After the StarLink debacle, Aventis sold those interests.

Over fifty percent of staple food crops are grown from seed marketed by ten corporations that include the transnational biotechnology corporations. In 2008, Monsanto added to its share by purchasing the Dutch seed company De Ruiter Seeds for €546 million. Monsanto provides the technology in 90% of the world's genetically engineered seeds.

Yet markets pay premiums for non-GE grains. Large importers - Britain and Europe, and especially Japan and Korea - refused engineered foods and grains, and those contaminated by transgenic material. Japan has expressed a zero tolerance for GE contamination. Importers are buying where they can obtain a GE-free guarantee. The Scottish Farmers Union described the adoption of transgenic crops as "commercial suicide."

Significantly, Ireland has declared itself committed to GE-free production and to marketing its products as such. Many other local regions in Europe and around the world have moved to protect the integrity of their food system and will continue to seek GE-free crops, seed and animal products. This represents a long-term trade opportunity that we contend will significantly outweigh claimed benefits envisioned from trade negotiations, e.g. with the USA. This current free-trade agenda is seriously compromised by negotiating a forced acceptance of GE foods, a reduction in regulatory oversight, and removal of so called 'non-tariff barriers to trade' such as labelling that will allow people to choose to avoid GE foods.

It is significant that US consumers are also demanding to know what is in their food and a majority would want to avoid GE-food. Such a betrayal of basic consumer rights has no place in a New Zealand. In polls, 90% of Americans want GE foods labelled, but vested interests and compromised governance continues to oppose the public will.

PSGR also notes and supports the call for US consumers - especially the elderly, infants and immune-deficient - to avoid GE foods, that has been made by the American Academy of Environmental Medicine. The British Medical Association has also provided similar advice for people in the UK.

A decade ago, rejection of transgenic crops by overseas customers resulted in dramatic slides in the US export tonnage shipped, especially of corn (USDA); likewise, Canadian canola. The US Economic Research Service expected corn/maize exports to continue falling in 2008/09 (www.ers.usda.gov). Production was saved largely by corn going into biofuel production.

The US transgenic soy market is buoyed by close to a 75% government subsidy. This drastically reduces the prices overseas oil seed growers receive who do not have the benefit of subsidies. The West spends some US$360 billion/pa in agricultural subsidies which cost developing countries around US$50 billion in potential lost agricultural exports. Fifty billion dollars is roughly equivalent to the level of development assistance.

The US currently pays around US$20 billion/pa in direct subsidies, estimated at in excess of 60% of every dollar a US farmer earns. Transgenic food crops corn, cotton and soybeans are included. Corn receives the highest level of subsidy.

Mexico has gone from having an abundance of maize to export to having to import to meet its needs. Production has plummeted because subsidies paid to US farmers have made it impossible for Mexican farmers to compete. Further, US trucks driving Mexican highways to deliver unmilled maize/corn have spilled transgenic seeds and seriously contaminated native land races in this, the centre of origin of corn.

Nobel laureate in economics, Joseph Stiglitz, argues that farm subsidies have a long term effect of raising global food prices. This harms poorer populations and increases malnutrition. Former head of the United Nations Development Programme, Mark Malloch Brown, has estimated that farm subsidies cost poor nations about US$50 billion/pa in lost agricultural exports and distorts global trade.

> 'The Tyranny of King Cotton', Joseph E Stiglitz, Guardian.co.uk, 24 October 2006; Barrie McKenna For U.S. farmers, subsidies the best cash crop The Globe and Mail, 25 November 2010; http://en.wikipedia.org/wiki/Agricultural_subsidy

New Zealand

The loss of New Zealand's 'GE-free' status would adversely affect Brand New Zealand's 'Clean Green' and 'Pure New Zealand' images so important in supporting New Zealand's export and tourism markets.

Many scientists feel New Zealand is being used for risky experiments rather than the developers' own backyard. The basis of the Report of the Royal Commission on Genetic Modification was "preserving opportunities" and eight of its 49 recommendations were designed to ensure that any release of transgenic organisms did not contaminate the products of other growers, including beekeepers.

What is at stake from growing transgenic crops is New Zealand's market access to food that can be guaranteed GE free, as is preferred by its export customers in Europe, Japan and other overseas markets. ('Report exposes Government inaction over GE,' 16 April 2008, Scoop - Independent News

A 2003 study from Lincoln University found the release of transgenic crops would have no financial benefit for producers. Multiple studies from the USDA, and university and private research have shown that, generally, transgenic crop yields are down on conventional varieties and despite 71% of transgenic crops being engineered for pesticide or herbicide resistance, chemical use has not been reduced. The Department has even advised planting fewer transgenic crops.

Surveys found the majority of New Zealand farmers would prefer to go organic than plant genetically engineered crops. In terms of primary health, this makes notably good sense, moving as it would away from agricultural chemicals. Studies have found organically grown food more nutritious than conventional crops. Experiments with methods of sustainable agriculture - in China, Kenya, the US and elsewhere - are reaffirming that pesticide use can be lessened and that insects are less damaging in multi-crop, rotational, sustainable farming situations than with the monocultural plantings dictated by the biotech industry. Denmark has made the decision to be organic by 2020.

Using sustainable and organic farming methods in New Zealand could be achieved to the benefit of its population, farmers and exporters. That option is not open to any country adopting transgenic crops. There is no feasible coexistence of GE crops with other conventional, IPM and organic farming given that it would require universal acceptance of standards that allow 1% GE contamination or more, with no control as to what GE contaminant, or its risk to the public, is entailed.

Conclusions

PSGR acknowledge that genetic engineering biotechnology is cutting edge science and strict, secure contained experiments may benefit humanity, particularly in the medical field. As it stands:

- it is not based on sound science, sound ethics or sound principles.
- it is driven by private profit to the detriment of those areas of the world where transgenic crops have been introduced
- adverse effects have been observed on the environment
- there is compelling evidence in animal trials of harm caused by GE foods including those already approved to enter the human food chain
- there is no independent testing of safety of GE foods or monitoring of impacts on public health
- there is inadequate labelling of GE foods, e.g. in cafes and restaurants, and for processed ingredients like oils
- consumers are increasingly unable to avoid GE foods, especially important for vulnerable sectors in the community

- segregation of GE crops has proven to fail and resulted in broad low-level contamination of food supplies with potentially devastating harmful results emerging over time
- bio-pharming and cloning of GE animals can result in extreme deformities and animal suffering that is unethical
- New Zealand's tourism and export economy requires sustainable and ethical approaches to building our clean, green, 100% pure, natural and ethical production system

The over-emphasis of research funding on genetic engineering molecular biology to the detriment of other approaches is long overdue for re-adjustment in order to preserve the local knowledge base that has been developed over decades within New Zealand's academic and other publicly-funded research institutions. The exciting new developments in molecular genetics research must be incorporated into a wider view of biological knowledge rather than being pursued as an exclusive goal presented by genetic engineering biotechnology. By doing this, our country will continue to make important contributions to humanity's legacy of scientific achievements.

Government has a duty of care. Decisions must be based on what is best for New Zealand and New Zealanders. The present history of genetic engineering biotechnology shows it could ruin New Zealand environmentally and economically, and bring health problems to its people. Common-sense and caution must dictate decisions.

PSGR would like government to establish:

- informed assessors and regulators, truly independent of proponent interests, to police any considerations relating to genetic engineering biotechnology and New Zealand
- education programmes for the public and those involved in genetic engineering biotechnology in this country uninfluenced by industry and price-tagged research monies
- an immediate moratorium on the use of GE organisms outside full containment pending cessation of the socialisation of risk from commercial use of GE organisms
- new standards for food regulation preventing importation of untested GE foods into the food chain
- the withdrawal of GE foods already approved, and development of pre-testing protocols, full labelling, and systems for public health monitoring and diagnosis of GE-food related heath issues

We hope government will take a common-sense, responsible attitude towards genetic engineering biotechnology on behalf of the public. This means ensuring that genetically engineered organisms continue to be kept under the strict controls of laboratory confinement, where they can be used for research and medical purposes, and are not released into the environment or the food chain.

We look forward to hearing from you.

Signed on behalf of the Trustees and Members of Physicians and Scientists for Responsible Genetics by Jean Anderson

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