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Copies to **All New Zealand Councillors**
District Health Boards and Public Health Units
All MPs and other appropriate recipients

For the attention of all New Zealand Regional Councils and Councillors

As recently elected representatives of residents in your region we acknowledge your responsibility and concerns for sustainable land use, limiting the consequences of releasing genetically engineered organisms into your environment, and preserving the reputation and integrity of regional economies for exporting clean, safe products that New Zealand overseas markets buy from us knowing they are free of genetically engineered DNA.

Physicians and Scientists for Global Responsibility is a Charitable Trust established to provide independent scientific assessment and advice on matters relating to genetic engineering and other scientific and medical matters. In this capacity, informative letters have been regularly addressed to all New Zealand Councillors since 2003.

It is important that Councillors know what genetically engineered organisms are and the reasons for the need for precaution particularly in the face of recent commercial pressure for the release of genetically engineered ryegrass in the New Zealand environment and deregulation of gene editing such as CRISPR (cas9).

The High Court of New Zealand and equivalent courts in the European Union have supported regulation of gene edited products as genetically engineered organisms (GEO). Consumers, producers and exporters benefit from protections to preserve non-engineered production and maintain the integrity of food safety and labelling systems.

Councillors should also be aware of the tremendous efforts for close to two decades made by Councils in Northland, Auckland, the Bay of Plenty and Hawkes Bay to protect ratepayers from the risks of releasing genetically engineered organisms into the New Zealand environment. These policies and protections are included in regional plans as an important local tier of oversight.

One concern for councils taken up by Local Government NZ has been the request for government to introduce strict liability to moderate commercial risk-taking that is 'socialised' on ratepayers. As some vested interests lobby for 'deregulation' there is also a growing call for the BioEthics Council to be reinstated, to advise on ethical issues such as gene editing in humans and farm animals.

This situation has led us to send the following material. We ask all re-elected and new councillors to read and absorb so that each representative can meet their duty of care to those in their region from a sound knowledge base.

Please note that the terms *genetic engineering* and *genetic modification* are used synonymously as in *genetically engineered* (or *modified*) *organisms* (*GEOs / GMOs*). The more recently proposed *Gene Editing* includes techniques such as CRISPR (cas 9). *Transgenic* and *biotechnology* are terms also used for the technologies.

Biotechnology has made important advances adding much of value to our scientific heritage. However, the technologies of genetic manipulation are seriously flawed, require effectual oversight and comprehensive regulation, and comprise only a very small part of biotechnology applications.

PSGR uses the term genetic engineering (GE) because it most closely represents the changes made when novel DNA is inserted into plant life.

PSGR's principle concern is with such novel manipulation of organisms being released into the New Zealand environments, both physical and human.

Once released into an environment, manipulated novel DNA is irretrievable.

As of September 2019, the Ministry of Primary Industries' website clearly states: "*No genetically modified seeds or nursery stock have been approved for release into New Zealand, so we have strict import rules to ensure no unapproved GM material arrives in the country*."[1] PSGR maintains that this should remain the status quo.

Moving genes between species involves the patenting of plants and animals. It has extended property rights into biology, providing the potential for direct control over much agricultural production and the food supply.[2]

In 1994, four major seed companies controlled 21% of the global market. Subsequently, mergers and the buying up of smaller companies means four transnational seed companies and four transnational agrochemical firms now control a large measure of their respective markets globally. Pesticide corporations producing genetically engineered seeds dominate the agricultural input market, effectively controlling the world's seed, pesticide and biotechnology industries.

Monsanto was claimed the world's largest seed producer, helped in this by owning the now-defunct patent and selling the glyphosate-based herbicide Roundup for use on its crops genetically engineered to withstand spraying with the chemical. Bayer, the second largest agrochemical company in the world, purchased Monsanto for $63 billion in 2018, a merger approved by the Canadian government. Bayer now owns 33% of the global seed market and 23% of the agrochemical market.[3]

In the US, the overuse of glyphosate associated with genetically engineered crops has aided the development of resistance to glyphosate in weed species, and to those species replicating to spread over millions of hectares of farmland.

Commercial plantings of transgenic food crops were first grown in the mid-1990s. It was soon apparent that they threatened the environment; e.g. glyphosate-resistant rye grass was established in Australia by 1998.[4]

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[1] https://www.mpi.govt.nz/importing/plants/seeds-for-sowing/genetically-modified-seeds-and-nursery-stock/
[2] See also http://www.psgr.org.nz/22-glossary/frontpage/1-welcome
[3] https://cban.ca/gmos/issues/monsanto/
[4] Volume 46, Issue 5 October 1998, pp. 604-607 'Evolved resistance to glyphosate in rigid ryegrass (Lolium rigidum) in Australia' Powles et al, DOI: https://doi.org/10.1017/S0043174500091165

Because of the horizontal gene transfer of the resistance to glyphosate DNA, crops that are resistant to another toxic herbicide, dicamba[5], are being developed. Herbicide resistance, or herbicide tolerance, engineered into food crops is aimed at allowing farmers to spray freely without killing the crop. Scientists predict wide-spread heavy use of dicamba will also lead to weeds resistant to that chemical.

The above developments raised concerns for many in New Zealand.

The Inter-Council Working Party on Genetically Modified Organisms (GMO) Risk Evaluation and Management Options (ICWP)

Northland Councils acted by establishing the ICWP in response to community concerns about transgenic organisms. The Far North, Whangarei and Kaipara District Councils, Auckland Council and Northland Regional Councils are represented on the working party. Find out more on http://www.wdc.govt.nz/PlansPoliciesandBylaws/Plans/Genetic-Engineering/Pages/default.aspx

Three major reports commissioned by the Working Party identified a range of risks involved with trialling and releasing genetically engineered organisms into the environment. The ICWP also gave approaches to managing the risks:

Genetically engineered organisms have become invasive and can affect non-target species including indigenous flora and fauna with long-term effects on ecosystems.

There may be effects on Maori cultural beliefs of whakapapa, mauri, tikanga.

There are ethical concerns about mixing genes from different species including human genes and the long-term safety of such novel food.

Economic risks include the loss of income through contamination, or perceived contamination, of conventional food products, with negative effects on marketing and branding opportunities such as 'clean and green' or 'naturally Northland', and the costs associated with environmental damage, e.g. clean-up costs for invasive weeds or pests which are seen as coming from the public purse.

There are limited liability provisions under the Hazardous Substances and New Organisms (HSNO) Act 1996.[6] Challenges have been made to the right of Councils to have ”precautionary statements” in their Regional Policy Statements and a cautionary approach with their Plans, and Councils’ rights have been upheld in New Zealand Courts.

What is genetic engineering?

Genetic engineering (GE) is the artificial, direct alteration of an organism's DNA. It usually involves genes being taken from a natural host and inserted into a new host; for example, fish genes into tomatoes and strawberries,[7] rat genes in lettuce, and genes from the cecropia moth into apples. It can also involve genetically engineering resistance genes for herbicides used by farmers, councils and home gardeners. The purpose is to insert a desired trait into a plant that does not have that trait.[8]

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[5] http://www.panna.org/sites/default/files/dicamba-NCAP.pdf
[6] https://www.boprc.govt.nz/media/321876/environment-court-decision-18-dec-2013-env-2012-339-000041-part-one-section-17.pdf
[7] http://thegreendivas.com/2011/06/10/waiter-theres-a-fish-in-my-tomato-a-gmo-story/
[8] https://www.nationalgeographic.com/environment/global-warming/food-how-altered/

The application of genetic engineering technologies alters the DNA of a living organism in ways that are much more radical than the generally incremental, slow processes of natural evolution.

PSRG sees fundamental research into these and other aspects of molecular biology as important to New Zealand; for example, using the technologies to produce pharmaceutical and industrial materials.

PSGR also sees that health and scientific professionals in New Zealand, indeed worldwide, have grave concerns about aspects of genetic engineering technologies. As we have said above, biotechnology has added much of value to our agricultural and scientific heritage. However, the trial and error approach to evaluating the effects of genetic manipulation is inappropriate and dangerous when novel organisms enter the natural environment.

The natural complex inter-relationships between organisms are genetically determined in ways about which we have too little knowledge. You can read more on www.psgr.org.nz and http://www.psgr.org.nz/faqs.

Currently, a New Zealand Crown Research Institute, trading as Scion, runs a limited scale open field trial of genetically engineered trees near Rotorua, some of which involve pine trees. Wilding pines[9] are a major and expensive problem for many New Zealand Councils and were recently in the news again. While claims are made of novel DNA being engineered not to procreate, it needs only a failure of 0.01 percent or less for procreation to take place. There is no guarantee failure cannot occur. Can Councils and government afford the potential cost/s of failure?

Other experiments in New Zealand are carried out in strict containment.

Approving engineered organisms for release into the New Zealand environment is the responsibility of this country's Environmental Protection Authority (EPA). However, once the EPA approves a genetically engineered organism for release their responsibility ends. There is no independent monitoring of effects, good or adverse.

New Zealand's history of genetic engineering experimentation outside of a laboratory is poor. A field trial of genetically engineered tamarillos was grown at the Kerikeri HortResearch station. At the time, lax security allowed the engineered crop to potentially cross-pollinate with commercial tamarillo crops.[10] Claims, counter claims and denials abounded, but these of themselves revealed that the dangers were known. A HortResearch spokeswoman is reported to have confirmed that trials of genetically engineered tamarillos were being done at Kerikeri and that "the fruit isn't even allowed to hit the ground." 'Hitting the ground' would potentially allow for cross contamination with tamarillos grown nearby. Promised monitoring after the experiment was reported as poor or non-existent. A Royal Commission on Genetic Modification (est. 2000)[11] acknowledged that public concern about the Kerikeri trial was justified.

PSGR maintains that the risks revealed – proven overseas in abundance – should not be allowed to contaminate the New Zealand environment. This is where Councils have a right to have a say. Councils in Northland, Auckland and Bay of Plenty have precautionary statements in their Plans.

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[9] https://www.doc.govt.nz/nature/pests-and-threats/common-weeds/wilding-conifers /
[10] The history of experimentation warrants airing. Modified tamarillos attract anti-GE protesters, 30 June 2000, Angela Gregory https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=105549; https://www.beehive.govt.nz/node/14500
[11] https://www.mfe.govt.nz/sites/default/files/media/Hazards/Royal%20Commission%20on%20GM%20in%20NZ-Final.pdf

A 2012 Colmar Brunton poll found 84 per cent of Hawke's Bay residents surveyed wanted a status free of genetically modified organisms for the region's food production. Hastings District Council secured GMO-free status in 2015. Federated Farmers appealed the decision through the Environment Court which upheld the Council's decision to prohibit the outdoor release and field trials of GMOs. Council and Ngati Kahungunu Iwi Inc worked closely to protect and safeguard the environment.[12]

Other polls have shown that a significant portion of the population does not want genetically engineered / modified organisms released into the environment.[13] Can Councils and government afford the potential cost/s of ignoring public opinion?

Proposed changes to the Resource Management Act could bar Councils from protecting their region

PSGR opposes the changes based on the record of past decisions made by New Zealand's central government and regulatory authorities.

New Zealand is in a unique position in that our borders are bounded by extensive distances of sea. Contamination is virtually impossible by air-borne DNA coming over those seas. We can potentially protect this country's environment and retain it as Clean Green and 100% Pure.

New Zealand's Ministry of Primary Industries requires testing of imported seed for the presence of transgenic seed for specific species and varieties of the following genera: Brassica, Glycine, Medicago and Zea.[14] In testing hundreds of kilograms of imported maize seed for sowing annually[15] the presence of transgenes has been found in sweet corn and maize multiple times.[16]

Food imports contaminated by viable transgenic organisms represent a risk to the international food and feed trade.[17] New Zealand imports around 200,000 tons of animal feed annually. This includes engineered crops claimed as "non-viable" which are inspected, although PSGR understands they are not tested by the Ministry of Primary Industries

Some plants are genetically engineered with one trait, some with more than one. This latter is known as 'gene stacking'. Monsanto's Smartstax includes eight introduced traits. The most common traits are herbicide resistance and using genes from the soil bacterium *Bacillus thuringiensis* to produce a Bt insecticide.

Glyphosate resistance

Since the first marketing of glyphosate in the 1970s, over 250 species have become resistant to its effects. It simply no longer kills them. In 2015, New Zealand had 12 glyphosate resistant species; three resisting multiple chemicals.[18] This resistance included glyphosate resistance in perennial ryegrass and Italian ryegrass. Some populations are also resistant to glufosinate which is used in genetic engineering of plants.

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[12] https://www.nzherald.co.nz/the-country/news/article.cfm?c_id=16&objectid=12099940. https://trueearth.co.nz/pure-hawkes-bay/.
[13] http://www.wdc.govt.nz/PlansPoliciesandBylaws/Plans/Genetic-Engineering/Documents/GE-Poll/GE-Poll-Results-Auckland-Region.pdf; http://purehawkesbay.org/wp-content/uploads/2012/06/OverwhelmingSupportforGMFreeHawkesBay.pdf.
[14] http://www.biosecurity.govt.nz/regs/imports/plants/gmo
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[16] http://www.biosecurity.govt.nz/regs/imports/plants/gmo/corn-maize
[17] https://www.euractiv.com/section/agriculture-food/news/fao-study-cases-of-gmo-contamination-rise/ FAO study: Cases of GMO contamination rise, Philippe Collet, 20 March 2014 (updated: 27 Mar 2014)
[18] https://resistance.nzpps.org/index.php?p=herbicides/introduction

Releasing resistant genetically engineered plants would contaminate the New Zealand environment. As we have said, once novel DNA is released into the environment, it is irretrievable.

Since engineered crops resistant to glyphosate were commercialised in the mid-1990s glyphosate use in the US has increased dramatically and its effectiveness has diminished.[19]

The industry solution is to use chemicals such as 2,4-D and dicamba, both of which belong to a chemical class that has been associated with increased rates of diseases, including non-Hodgkins lymphoma.[20]

Another industry solution is to develop genetically engineered crops which scientists see as creating new generations of increasingly more intractable weeds controlled with yet more herbicides, leading to an era of much increased use of and dependence on pesticides.

Introduced genes can transfer to other species in a process called horizontal gene transfer (HGT)

Transgenic DNA has crossed between corn/maize varieties, between canola varieties, and between engineered crops and wild relatives.

Just five years after the release of the first genetically engineered commercial crops in Alberta, Canada, chemical and DNA testing confirmed canola volunteers had acquired resistance to three chemicals: Roundup, Liberty and Pursuit.[21] In Argentina, transgenic soy and corn/maize comprise 100% of production of those crops. A 2019 official figure of 340,000 tonnes was given for soybeans imported into New Zealand. Are these or any other imported genetically engineered crops extensively tested? A survey by Friends of the Earth found agricultural chemical use between 1990 and 2013 has risen from 3 to 12 litres per hectare largely due to engineered crops.

Genetically engineered High Metabolisable Energy (HME) ryegrass

Of particular concern for New Zealand is the potential introduction of genetically engineered HME ryegrass.[22]

English perennial ryegrass is the principal seed used for permanent pasture for grazing, hay and silage. New Zealand's exported ryegrass seed meets a substantial percentage of global demand, contributing significantly to the economy; perennial ryegrass being dominant in herbage seed production, supported by an international reputation as a supplier of high-quality seeds. In 2018, pasture seed exports earned NZ$98m; 45% of total exported seed sales.[23]

Export markets - the US, Australia, Europe, Japan, China and South America - look for purity and trueness to type, qualities based on our solid reputation and the fact that we are free of the engineered gene/s contamination that has resulted overseas from growing genetically engineered crops. A key part of this success is the voluntary seed certification and isolation distance management systems (SCID) being operated for the industry by AsureQuality Limited, a State-owned enterprise[24]. Pasture seeds - primarily ryegrass and clovers - also support our livestock and dairy industry, which represents 60 percent of NZ's exports.

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[19] http://www.ers.usda.gov/amber-waves/2015-may/managing-glyphosate-resistance-may-sustain-its-efficacy-and-increase-long-term-returns-tocorn-and-soybean-production.aspx#.VtTiPECqCul

[20] http://www.ucsusa.org/food_and_agriculture/our-failing-food-system/industrial-agriculture/the-rise-of-superweeds.html#.VtYadkCqCuJ

[21] https://www.organicconsumers.org/old_articles/ge/superweed.phpl; http://weedscience.org/mutations/mutationdisplayall.aspx

[22] https://www.agresearch.co.nz/news/hme-ryegrass-making-steady-progress/

[23] 16 February 2018 https://farmersweekly.co.nz/#

[24] https://www.govt.nz/organisations/asurequality-limited/

PGG Wrightson and the New Zealand taxpayer are partners to the development of an engineered ryegrass and field trials are being run in the US.

Perennial ryegrass is a highly out-crossed, wind-pollinated species, and is subject to extensive gene flow. A significant concern is the possibility of novel genes being taken up in other plants nearby. The potential rate of natural cross-pollination reduces with distance, but it is not known how many times cross-pollination can continue by a hop, skip and a jump, or for what distances, or for what period of evolutionary time.

For example, while most of the gene flow occurred within two kilometres in the direction of prevailing winds, researchers found evidence from a monitored planted area of a RoundUp-resistant transgene from genetically engineered bentgrass (Agrostis stolonifera L) in a related species (Agrostis gigantea) growing 14 km away and in wild-growing plants of the same species 21 km away.[25]

For anyone not convinced that transgenes in pollen can travel that far, 'Pollen-Rain from Vegetation of Northwest India,' reported pine pollen found in Northern India over 600 km from the nearest pine trees. New Zealander, Faranty Desborough, an experienced pilot, speaking to the Hawkes Bay Times in October 2003 said, “I have flown in a thermal at 7000 feet altitude over a corn field that was being harvested and was surrounded by corn husks that were being sucked up by the thermal.” A southerly wind will carry sand from the Sahara Desert to settle on cars in London and just four days after the first bombing raid over Iraq in 2003, traces of depleted uranium from fired weaponry were detected in New York.

Once in the atmosphere, pollen and other particles can travel the globe. Perennial ryegrass cross-pollinates freely with annual and Italian ryegrass. Consequently, many hybrid ryegrasses have developed. Ryegrasses are typical of invasive weed species found in rural and urban riparian zones. Grass seeds can germinate after passing through an animal's digestive system. Seeds recovered from faeces 12-24 hours after feeding proved viable and seedlings started to emerge one week after planting. Seeds have also been transported in the wool of sheep and, in the case of perennial ryegrass, remained in the wool for 1-2 months.

Recent proposals for developing ryegrass include not using genetic engineering while another suggests we adopt engineered ryegrass. It is a position that needs the strictest scrutiny. It would be impossible to protect the genetic purity and trueness to type of perennial ryegrass from artificially created engineered genes. Escapees can simply go on spreading and contaminating. We cannot guarantee control over their movement: by human or mechanised traffic; by insects, birds and mammals; by wind, rain or flooding. Genetically engineered plants can potentially wreak ecological havoc. Can Councils afford the potential cost/s of allowing engineered ryegrass in their region?

Speaking on a DVD - A Silent Forest: The Growing Threat, Genetically Engineered Trees – Dr David Suzuki of The Suzuki Foundation, says: “As a geneticist, I believe there are far too many unknowns and unanswered questions to be growing genetically engineered plants – food crops or trees – in open fields.” The ideas of genetic engineering are dangerous because we don’t have a clue what the long-term impact is going to be.

Exports and tourists

A Ministry for the Environment report, *Our clean green image: What’s it worth*? asked ‘Is the environment valuable?’ It confirmed the New Zealand clean green image is what sells, that New Zealand companies need to understand who their customers are and what really makes a difference to those customers.

[25] Evidence for landscape-level, pollen-mediated gene flow from genetically modified creeping bentgrass with CP4 EPSPS as a marker, Lidia S. Watrud et al PNAS October 5, 2004 101 (40) 14533-14538; www.pnas.org/content/101/40/14533.

This applies to Councils serving their local industries and communities. Common-sense should tell us that the practical thing to do is to protect our environment, our economy and the well-being of New Zealanders. Why endanger that by releasing engineered genes into the environment?

This country's primary exports are dairy products, meat, fruit and fish. About 95% of our agricultural produce is exported. New Zealanders and many overseas markets want 'GE-free' foods. Germany, strongly anti-GE, buys our meat and dairy products worth some NZ$756 million/pa. Japan buys around 11% of our exports and has refused imports because of potential contamination.

A prime indicator of why New Zealand should not release or grow genetically engineered organisms is because insurance companies will not insure against damage and governments are reluctant to legislate on liability. When Minister for the Environment, David Benson-Pope confirmed that if transgenic contamination occurs in New Zealand it will be those affected by the pollution who will pay - local councils and growers.

An increasing number of Councils are looking at how to handle genetically engineered organisms in their region. Concerns cover contamination, and the impact on local industry, agriculture, health and tourism. It is vital Councillors understand the risks and act accordingly to meet their duty of care. Can Councils and government afford the cost of no action?

Fortunately, New Zealand has strong bio-safety laws and application procedures. Despite this, not all the decisions made are considered wise by independent scientists and experts. Government and regulators are heavily lobbied by industries. By having precautionary statements in hand, Councils can look after their immediate duty of care, their residents and environment.

Jean Anderson
On behalf of
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List of GE crops and information on them http://www.isaaa.org/gmapprovaldatabase/cropslist/

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Ends