Submission No. 001

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Subject: All New Zealand Councils

Attachments: NZCouncils2015.pdf; 2015CouncilsAppendix.pdf

Mayors, Councillors and CEOs of all Regional, District and City Councils in New Zealand,
cc Members of Local and Community Boards

Submission to Council's Future Community and Regional Plans

We ask that you accept and consider the attached as a submission, with feedback, when establishing your planning and budgeting documents.

We also ask recipients to distribute to members of your local and community boards. Thank you.

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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.

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10 February 2015

Mayors, Councillors and CEOs of all Regional, District and City Councils in New Zealand,
cc Local and Community Boards, and CEOs and Board Members of all District Health Boards

Submission to Councils Future Community and Regional Plans

The Trustees of PSGR thank Council for their response to previous correspondence.

We ask that you accept and consider the following as a submission, with feedback, when establishing your planning and budgeting documents and in so doing support a sustainable future for your district and a healthy community, and in doing this draw support from members of District Health Boards and Community and Local Boards.

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.

We accept many Councils have already taken steps to meet public demand in matters of genetically engineered organisms released into the environment and thank them for doing so. While other Councils leave such concerns to central government, it is important to consider the impacts at local levels extending beyond the timeframes and jurisdiction of central government authorities like the Environmental Protection Authority.

In meeting their duty of care, the work undertaken by the Northland and Auckland Councils forming the Inter-Council Working Party (ICWP)[1] provides experience and guidance for all New Zealand Councils. The ICWP sought legal advice and Council members have placed or are in the process of placing precautionary statements in their Plans to protect their communities and regions.

The ICWP work has highlighted the shortcomings in the HSNO Act including a lack of strict liability to moderate commercial risk taking and no mandatory requirement for the EPA to take a precautionary approach to experiments and release outdoors of transgenic organisms. We note that legal representatives of companies submitting against council controls in regional plans claim the opposite is the case, but they provide no reference to show any requirement for the EPA to take a precautionary approach.

[1] http://www.fndc.govt.nz/your-council/meetings/record-of-meetings/2012-archived/2012-08-30-council-record-of-meeting/2012-08-30-Council-4.3-Inter-Council-Working-Party-on-Genetically-Modified-Organisms.pdf

The ICWP commissioned an independent poll which showed how necessary was Council input.[2] In December 2013 community opinion was confirmed when a national poll by Colmar Brunton, undertaken for Pure Hawke's Bay, showed 79% of New Zealanders support Councils being able to use the RMA to protect farmers, exporters and their residents from the long-term unmanaged and known and unknown risks of genetically engineered organisms. Risks include exposure to increasingly more toxic chemicals.[3]

Reports from qualified bodies on transgenic organisms include New Zealand's own McGuiness Institute, a privately funded, non-partisan think tank working for a sustainable future, contributing strategic foresight through evidence-based research and policy analysis.[4] Ten years after the New Zealand moratorium on genetic engineering ended a McGuiness Institute study suggests it is time for it to be reinstated and time for a strategy to benefit the economy as a producer of food free of transgenic DNA for the world market. The Institute found that despite huge investment in experiments on transgenic plants and trees, there has been little benefit and significant economic risk incurred. Protecting the value of New Zealand's status as a producer of safe, high quality food, is of national strategic importance. The benefits are equally relevant for regional economic development and public health.

When the Bay of Plenty Regional Council placed a precautionary statement on genetic engineering in their long-term plans, an appeal lodged by Scion (NZ Forest Research Institute) went to the Environment Court. The Court decision released on 18 December 2013[5] allowed the BOP RC to retain reference to transgenic organisms in its Regional Policy Statement. The Court's decision sets a precedent. It clearly indicates that the Resource Management Act can be used to manage such activities in the Bay of Plenty region and it will also assist any future case in front of the Environment Court on this emerging issue. Communities and industries in the Bay can now work towards the inclusion of stricter rules in their District and City Plans to protect and keep their 'GE-free' environment status and marketing advantage. The Regional Policy Statement includes a policy directive to apply a Precautionary Approach to activities that have scientific uncertainty and where there is a serious risk of irreversible adverse effects. This can apply to the use of transgenic organisms in the BOP environment.

The Environment Court recognised the community concerns regarding the outdoor use of transgenic organisms. It also indicated in its decision that the Council may propose more directive regulation in the future, including policies, objectives, and methods. These regulations would come as a result of further investigation, via a Section 32 report, showing that transgenic organisms are elevated to a matter of regional significance. The Court decision will also encourage New Zealand Councils to take steps to protect their communities in a similar manner.

Local government's role is to work in service to the public interest of present and future generations. Local government responsibility encompasses the environmental and social spheres in their regions. The precautionary approach as discussed here speaks to this responsibility in regards to new technologies such as any proposal to release transgenic organisms.

Read the legal opinion by Dr Roydon Somerville QC on 'Managing Risks Associated with Outdoor Use of Genetically Modified Organisms' (January 2013) on http://www.wdc.govt.nz/PlansPoliciesandBylaws/Plans/Genetic-Engineering/Documents/Proposed-Plan-Change/Legal-Opinions-combined.pdf and a statement from Dr Kerry Grundy, ICWP Convener on www.rmla.org.nz/upload/files/obiter/jurisdiction_of_councils_to_regulate_gmos_under_the_rma_-_dr_k_grundy.pdf.

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[2] http://www.wdc.govt.nz/PlansPoliciesandBylaws/Plans/Genetic-Engineering/Pages/default.aspx.
[3] http://purehawkesbay.org/overwhelming-support-for-local-decisions-on-gm-free-status-national-poll/
[4] http://mcguinnessinstitute.org/Site/Publications/Project_Reports.aspx. 'An Overview of Genetic Modification in New Zealand 1973-2013: The first forty years' published in August 2013.
[5] http://www.boprc.govt.nz/media/321876/environment-court-decision-18-dec-2013-env-2012-339-000041-part-one-section-17.pdf

The ability to manage activities can be hindered by a lack of understanding about environmental processes and the effects of activities. Therefore, an approach which is precautionary but responsive to increased knowledge is required. It is expected that a precautionary approach would be applied to the management of natural and physical resources wherever there is uncertainty, including scientific, and a threat of serious or irreversible adverse effects on the resource and the built environment. It is important that any activity which exhibits these constraints is identified and managed appropriately. Although those intending to undertake activities seek certainty about what will be required of them, when there is little information as to the likely effects of those activities, public authorities are obliged to consider such activities on a case-by-case basis. Such consideration could be provided for in regional and district plans, through mechanisms such as zoning or rules enabling an assessment of effects through a resource consent process, or through other regulation such as bylaws. Any resource consent granted in such circumstances should be subject to whatever terms and conditions and/or reviews are considered necessary to avoid significant adverse effects on the environment and protect the health and safety of people and communities.[4]

With the protection of a precautionary statement, Council can oversee and control for any transgenic content in feed coming into their region and in foods sold in eating establishments. Those involved could be asked to supply test results that prove that their product does not compromise food and environmental safety before their product is allowed to be imported into regions under Council's jurisdiction. For example, with strict control of food safety of restaurants, etc., Council can use testing to show that feeding glyphosate-contaminated feed has or has not contaminated food supplies such as dairy and meat products with glyphosate or with fragments of transgenic DNA. Establishing or negating risk, Council can ban any product that creates any unacceptable risk to food and environmental safety. A regional strength would be being able to advertise a guarantee of products free of genetically engineered organisms in your jurisdiction. (See page 9 of attached document on feed imports.)

PSGR advises against the release of transgenic organisms. Should any approvals be made against this advice by New Zealand's EPA leading to the release of transgenic organisms, PSGR supports the following additional protocols:

- Making any outdoor experiments or field trials approved by the EPA a discretionary activity subject to stringent local additional conditions, particularly those not required under the Hazard Substances and New Organisms (HSNO) Act;
- Applicants paying a substantial bond and being held fully accountable for any necessary remediation and other costs;
- Establishing stringent on-going monitoring of releases by independent scientists. Under the HSNO Act, the EPA ceases to have responsibility or jurisdiction over an approved release of a transgenic organism once that new organism ceases to be considered as such. Little or no further attention or testing by an independent body applies.

Such requirements are needed to protect New Zealand's:

- Biosecurity;
- Unique biodiversity;
- Producers and exporters of primary products from agriculture, horticulture, beekeeping, viticulture, silviculture and forestry, and its gardeners;

- Food sovereignty;
- Heritage seeds;
- Growing domestic and export organic industry;
- Environment and economy as a whole;
- Public health from the proven and potential risks posed by releasing genetically engineered organisms into the environment.

It is important to realise that irrespective of planned changes to the RMA announced by government and seeking to prevent council oversight of genetically engineered organisms, other policy and legislative action is required.

A further concern is that if the Trans-Pacific Partnership Agreement (TPPA) includes allowing biotechnology companies such as Monsanto to sell their transgenic seeds in New Zealand with, as suggested, penalties for refusing to do so, this country would lose its GE free status. This is in opposition to the wishes of the majority of the public, and would damage exports, tourism and our 100% Pure New Zealand reputation.

Transgenic applications in agriculture have made the problems of industrial monoculture cropping worse and do not support a sustainable agriculture and food system with broad societal benefits. The technologies have been employed in ways that reinforce problematic industrial approaches to agriculture.

Policy decisions about the use of genetic engineering technologies are too often driven by public relations campaigns run by the biotechnology industry, rather than by what science tells us about the most cost-effective ways to produce abundant food and preserve the health of farmland.

PSGR acknowledges there may be potential benefits from genetic engineering technology and supports continued advances in molecular biology, which is the underlying science, when fully contained, supervised use of genetically engineered technology is for the furtherance of ethical science. We are critical of the business models and regulatory systems that have characterized early applications of the various transgenic technologies involved.

PSGR does not gain an advantage in trade competition.

PSGR urges all Councils to apply strong precautionary policies on genetically engineered organisms for Unitary, Local and Regional plans to meet your duty of care to your community and to protect district environments. We also call on Councils and District Health Boards to be cognisant of the risks of genetically engineered organisms in terms of human health. We ask that the information here and attached be taken into account for current and future considerations to manage any potential release of genetically engineered organisms in the environment in your region.

Please consider this correspondence as a formal submission to your plans. We wish to be kept informed of the process of submissions and outcomes. In general we do not wish to appear to speak to the submission at hearings, although we are open to invitation by Councils and District Health Boards to address representatives on genetic engineering when required and feasible.

We suggest your Council appoint a contact representative with whom we can work more closely, and to whom we can supply further information and/or answer questions from Council.

We look forward to your response.

Jean Anderson
on behalf of the Trustees of Physicians and Scientists for Global Responsibility New Zealand Charitable Trust

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Ends

Why New Zealand should not release genetically engineered organisms into the environment

NB genetic engineering, genetic modification and transgenic are synonymous
Only a very small percentage of biotechnology is given to genetic engineering

What is genetic engineering and what problems does the technology present?

The application of genetic engineering technology alters the DNA of a living organism in ways which are much more radical than what occurs due to the generally incremental, slow processes of natural evolution. It does this in a way that is inevitably disruptive to some degree as a result of the essentially random insertion of transgenic (or cisgenic) DNA into the functional DNA of a host organism. It may cause noticeable changes in the appearance of the organism and/or differences in the biochemistry and physiology of the organism. These changes are unpredictable and may result in the production of new proteins within the transgenic organism with potential toxic effects,[1]

The insertion of more than one sequence of DNA in a transgenic plant is described as 'gene stacking' or 'pyramided' traits. Stacking has been found to cause unexpected effects, including synergistic effects, which are not investigated in regulatory authorisations.[2]

When transgenic organisms are released into the environment transgenes can be transferred to other organisms so that the engineered characteristics spread through the eco-system in compatible host plants. For example, farmers in the US face having to eradicate weed species that have developed herbicide-resistant traits, including some with resistance to multiple herbicides. These so-named 'superweeds' can grow aggressively and out-compete transgenic crops, and now infest large tracts of agricultural land. The over-application of herbicides and pesticides in general and to transgenic herbicide-resistant crops has increased substantially the volume of agricultural chemicals used and this has aided in the development of weeds resistant to those chemicals.

The Australian government has committed AUD$15.3 million over four years to establish a comprehensive National Weeds and Productivity Research Programme to reduce the impact of invasive plants such as weeds contaminated with novel DNA.[3] Weeds already cost Australia over AUD$4 billion/pa for control and in lost production.[4]

Wild radish (*Raphanus raphanistrum*) costs the Australian grain industry AUD$140 million/pa.[5] Britain's advisory committee on releases to the environment (ACRE) identified wild radish, wild turnip, hoary mustard, brown mustard and wild cabbage as species from which hybrids could form with transgenic canola/rapeseed varieties. In one field trial plot, 46% of seeds in a wild turnip plant were found to be contaminated with transgenic DNA.[6]

Wild radish, wild turnip and wild cabbage grow in New Zealand. New Zealand already has 'superweeds' caused by the over application of the herbicide, glyphosate.[7]

Biotechnology companies reason the solution is to genetically engineer crops that are resistant to chemicals more toxic than those currently used. Such applications will further contaminate weed species with DNA that will resist those chemicals which will fail to kill those weeds. Resistant weeds can occur in all parts of the environment, especially in fields of crops and roadsides.

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[1] Other official definitions of genetic engineering technology include http://www.csiro.au/Outcomes/Food-and-Agriculture/WhatIsGM.aspx, http://www.who.int/topics/food_genetically_modified/en/ and http://ec.europa.eu/food/food/biotechnology/index_en.htm.
[2] 'Failure to yield - Evaluating the Performance of Genetically Engineered Crops' - Union of Concerned Scientists http://www.ucsusa.org/sites/default/files/legacy/assets/documents/food_and_agriculture/failure-to-yield.pdf
[3] http://www.daff.gov.au/natural-resources/invasive/national_weeds_productivity_research_program
[4] http://www.csiro.au/en/Outcomes/Safeguarding-Australia/Aust-Weed-Management.aspx
[5] http://www.daff.gov.au/natural-resources/invasive/national_weeds_productivity_research_program
[6] www.guardian.co.uk/science/2003/jul/10/gm.sciencenews
[7] http://www.3news.co.nz/Weeds-herbicide-resistance-a-big-concern/tabid/1160/articleID/280328/Default.aspx .

In the Application from Dow Agroscience for its Enlist Duo product resistant to 2,4-D and glyphosate[8] the company stated that tens of millions of acres of US farmland are infested with glyphosate resistant weeds and the problem has grown worse every year. (NB 2,4-D is an ingredient in Agent Orange.)

Transgenic crops are also being released to resist 2,4-D and dicamba (a herbicide in the 2,4-D family), HPPD-inhibiting herbicides, and glyphosate and AL (GAT).[9] Scientists confirm transfer to weeds and other species of these novel DNA sequences is inevitable. For a graph of the 'Increase in Unique Resistant Weed Cases for the USA' see page 6 on http://www2.epa.gov/sites/production/files/2014-11/documents/enlist-duo-technical-briefing-cbi-redacted.pdf.

Developers claims transgenic crops benefit farmers. A film released in October 2013 shows a study on the socio-economic impacts of transgenic corn on the lives and livelihoods of US farmers after over 10 years of commercial growing. Farmers explain how they became indebted because of the rising cost of transgenic seed and the increasing cost and quantity of inputs used such as herbicides.[10] View another released 14 June 2011.[11]

The United Nations International Assessment of Agricultural Knowledge, Science and Technology for Development (IASSTD) is a large, comprehensive study. It supports the premise that transgenic crops could threaten food security.[12]

1 Genetic engineering in the New Zealand environment

1.1 Genetically engineered trees

Significantly and of much concern to PSGR was the approval[13] for the New Zealand Forest Research Institute, trading as Scion, to plant *pinus radiata* with a number of engineered traits. The premise was that the trees would largely be engineered using what is commonly termed 'terminator' technology, making them sterile and thus not able to flower or replicate. The variants of terminator technology offer no absolute guarantee of sterility. The traits can break down and the trees revert to flowering. Genes can spread horizontally in soil bacteria, fungi and other organisms in the extensive root system of forest trees. There could be long-term impacts on soil biota and fertility. Trees that do not flower and 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, horticulturalists and crop growers.

Wilding pines are already invasive in many parts of New Zealand and herbicide-resistant pines could lead to wilding pines becoming 'super' weeds. Conventional *pinus radiata* seeds are viable "at least up to twenty-four years"[14] and distance is no guarantee of safety from contamination. Singh el al (1993)[15] found pollen from pine trees had travelled over 600 kilometres. It would need a failure rate of only a part of a percent for transgenes in tree pollen to contaminate other trees, potentially at great distances, in ways that could not easily be monitored.

The risks of releasing transgenic DNA are environmental and economic. Terminator technology has attracted a voluntary moratorium from many countries because of the risks involved. The effect on New Zealand's reputation overseas and our export markets of using terminator technology would be damaging.

1.2 Genetically engineered ryegrass

New Zealand scientists are running experiments with transgenic rye grass overseas. Dr Michael Dunbier of AgResearch claims the benefits of transgenic grasses outweigh the potential negative responses. Confusion has entered the debate by the use of the term "cisgenic"; a form of genetic engineering that uses genes from a single species.[16]

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[8] Registration of Enlist Duo™ Herbicide, 15 October 2014 http://www2.epa.gov/ingredients-used-pesticide-products/registration-enlist-duo
[9] www.soils.wisc.edu/extension/wcmc/2012/ppt/Davis_2.pdf
[10] Ten years of failure: farmers deceived by GM corn, Masipag 12 June 2014, http://www.grain.org/bulletin_board/entries/4958-ten-years-of-failure-farmers-deceived-by-gm-corn
[11] GM Crops Farmer to Farmer https://www.youtube.com/watch?feature=player_embedded&v=jEX654gN3c4
[12] www.agassessment.org/docs/SCReport,English.pdf.
[13] PSGR submission to the Environmental Risk Management Authority, now the jurisdiction of the EPA: 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
[14] 'The Fire Pines', Richard Warren and Alfred J Fordham, http://arnoldia.arboretum.harvard.edu/pdf/articles/1040.pdf
[15] G Singh et al., "Pollen-rain from vegetation *of* North-west India." *New Physiologist* 72, 1993, pp. 191-206.
[16] NZ scientists running GM field trials, 1 September 2012, *New Zealand Herald*, http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=10830932

A key question is, are there potential benefits to introducing transgenic ryegrass? The facts suggest not. For our neighbour, Australia, ryegrass (*Lolium rigidum*) is a problematic weed.

The country's first glyphosate-resistant weed was annual ryegrass (Lolium rigidum) which emerged in 1996 in the State of Victoria.[17] Commercial herbicide-resistant cotton was grown there in 1996 and may have contributed the resistance trait. Since 1996, glyphosate-resistance has been confirmed in eight other weed species. In 2013, the Australian Glyphosate Sustainability Working Group supported by the Grains Research and Development Corporation, confirmed the first case of glyphosate plus paraquat resistance in a weed species in Western Australia.[18]

Across Australia, resistance has been found in broadacre cropping, chemical fallow, winter and summer grains and irrigated crops. Ryegrasses and tall fescue occur as typical weed species in riparian zones in rural and urban areas, affecting horticulture, tree crops, vine and vegetable crops, driveways, fence lines and crop margins, around buildings, irrigation channels and drains, waterways, wetlands, airstrips, railways, roadsides, floodplains, and public areas. In New Zealand, contamination by glyphosate-resistant DNA would cause like damage.

The Department of Primary Industries, State of Victoria, has published an overview of baseline biological information relevant to the risk assessment of genetically engineered forms of ryegrass species released into the Australian environment.[19] It states that Italian ryegrass, perennial ryegrass and tall fescue are "highly outcrossing, wind pollinated species" and all three are listed as weeds in native and agricultural ecosystems throughout Australia. Extensive gene flow can occur of viable and non-viable material, and dispersal of pollen can be "forward, backward and upward". Pollen clouds can rise high into the atmosphere, move with wind patterns and be re-deposited in times of calm weather.[20] It is conceivable that pollen could move significant distances from the source, and studies have shown that the amount of pollen dispersed/deposited does not always decrease with increasing distance from a source.[17]

Grass seeds are also capable of germination after passing through the digestive systems of grazing animals. Viable seeds of perennial ryegrass, Italian ryegrass and tall fescue have been recovered from faeces 12-24 hours after feeding. Seeds of Italian and perennial ryegrass were found transported in sheep wool, the perennial ryegrass seeds still found after 1-2 months. Moving such stock would increase the risk of spreading contaminated material. Viable Italian ryegrass seeds have also been found in the faeces of European hares showing wild animals assist in seed dispersal, as do birds, irrigation water, storm water runoff and human traffic.

Seed persists in soil, dormancy time varying. A New South Wales study of tall fescue and perennial ryegrass showed 14 months after seed production the seed bank contained 14% perennial ryegrass and 10% tall fescue seed. Under controlled conditions, seeds of tall fescue and Italian ryegrass maintained germination ability for at least 12 months. Researchers found that the likelihood of weediness is increased by the intentional introduction of plants. Lolium species have many weedy characteristics and are capable of adapting rapidly to their environment, producing large amounts of seed which are easily dispersed.

The ryegrasses in general are significant weeds among wheat crops worldwide. Italian ryegrass can be a difficult-to-control contaminant in turf-grass farms and cause decreased marketability of cool-season sod. New Zealand growers produce ryegrass/fescue turf for use in lawns, sports, parks and reserves, racecourses, vineyards and orchards. If sods were contaminated, they could spread transgenic traits throughout the country. Volunteer tall fescue growing near certified seed production enterprises requires control measures to prevent contamination of the seed. (See next page).

Seed production for overseas sales is a big export earner for New Zealand. The New Zealand Grain & Seed Trade Association (NZGSTA[21]) website says: "Many New Zealand-bred cultivars, especially ryegrass, tall fescue and clover species, are commercially adopted in other countries. Pasture seed has traditionally been the mainstay of New Zealand seed exports," and goes to over 60 countries. Statistics New Zealand figures show their value continues to rise.

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[17] *Sydney Morning Herald*, 8 May 2012.
[18] See more at: http://www.grdc.com.au/Media-Centre/Media-News/National/2013/11/Paraquat-and-glyphosate-resistant-ryegrass-a-wake-up-call#sthash.YehKdgZM.dpuf
[19] 'The Biology of Lolium multiflorum Lam. (Italian ryegrass), Lolium perenne L. (perennial ryegrass) and Lolium arundinaceum (Schreb.) Darbysh (tall fescue)', #AG1241; 1 May 2008 Version. Australian Government Office of the Gene Technology Regulator http://www.ogtr.gov.au.
[20] A report in the *Hawkes Bay Times* (October 2003) described how an experienced pilot, flying "in a thermal at 7000 feet altitude over a corn field that was being harvested" was "surrounded by corn husks that were being sucked up by the thermal."
[21] http://www.nzgsta.co.nz/

Herbage seed from rye grass, clover and other grasses accounted for 53 per cent of total seed exports by value and Australia, the largest market, accounts for 16 per cent of total shipments.[22]

NZGSTA general manager, Thomas Chin, is reported to have said New Zealand is "a world leader in seed multiplication and its strong export performance is consistent with the Government's business growth agenda and its goal to increase the ratio of exports to GDP from the current 30 per cent to 40 per cent by 2025."

Seed and grain production for export is based in the temperate plains of the east coast of both islands. New Zealand does not need transgenic pasture grasses potentially destroying this valuable industry and other agribusinesses by contaminating agricultural land.

1.3 More on genetically engineered crops

It is reported that four international biotechnology companies control over 50% of the global market; companies involved in the development of transgenic seed crops and in producing herbicides. Monsanto, the US-based multinational agricultural biotechnology corporation, is a leading producer of Roundup, their proprietary herbicide with glyphosate as its active ingredient. In 2003, Monsanto also produced over 90 percent of the transgenic seeds planted globally.

Transparency Market Research (http://www.transparencymarketresearch.com/) has estimated the global glyphosate herbicides market was valued at US$5.46 billion in 2012 and predicts it to reach US$8.79 billion by 2019. In 2012, transgenic crops accounted for 45.2% of the total glyphosate demand and glyphosate demand for conventional crops has been increasing substantially as a result of the growth in unsustainable agricultural practices globally.[23] Such transnational companies hold enormous sway in decisions made by governments and regulatory authorities.

Gene flow is a natural phenomenon not unique to transgenic crops. It can occur via pollen, seed and vegetative propagules. Gene flow from transgenic glyphosate-resistant crops can result in the transgene entering the DNA of other crops or weeds and which may negatively impact markets. Gene flow can also produce glyphosate-resistant plants that may interfere with weed management systems.[24] Gene flow via pollen and seed from glyphosate-resistant canola and creeping bentgrass fields has been documented and the presence of the transgene responsible for glyphosate resistance has been found in commercial seed lots of canola, corn and soybeans.

When a weed crossbreeds with a farm-cultivated relative and acquires new genetic traits – including engineered DNA that make it more hardy – the hybrid weed can pass the traits on to future generations. The result may be very hardy, hard-to-kill weeds. Farmers in the US have seen the significant impact of transgenic DNA outcrossing to weed species and contamination of large tracts of land by those weed species. In 2012, 49% of US farmers reported they had glyphosate-resistant weeds on their farm, up from 34% in 2011. Regular surveys indicate that the rate at which glyphosate-resistant weeds are spreading is gaining momentum; increasing 25% in 2011 and 51% in 2012. Not only are glyphosate-resistant weeds spreading geographically, the problem is also intensifying with multiple species now resistant on an increasing number of farms.[25]

If introduced, experience overseas shows transgenic crops will contaminate and potentially destroy our valuable agri-business. In meeting their duty of care, the work undertaken by some local Councils on behalf of farmers and other ratepayers and residents in their region has highlighted the shortcomings in the HSNO Act, including a lack of strict liability and no mandatory requirement for the EPA to take a precautionary approach to outdoor transgenic organisms' experiments and releases, nor to monitor releases.

1.4 Genetic engineering – would it be a good thing for New Zealand agriculture?

The New Zealand Government is seen as maintaining one of the most comprehensive and rigorous approval regimes for genetically engineered organisms in the world. To date, several contained trials have been conducted, but no organization has submitted an application for a conditional or full-scale release of a transgenic organism.[26] In the two decades since transgenic crops were released for commercial crops, New Zealand's regulatory authorities – initially the

[22] http://www.stuff.co.nz/business/farming/cropping/9695230/Seed-exports-rise-in-value
[23] See the full report on www.transparencymarketresearch.com and http://www.transparencymarketresearch.com/glyphosate-market.html
[24] 'Gene flow from glyphosate-resistant crops', Mallory-Smith and Zapiola, Pest Manag Sci. 2008 Apr; 64(4):428-40. doi: 10.1002/ps.1517. http://www.ncbi.nlm.nih.gov/pubmed/18181145
[25] http://farmindustrynews.com/ag-technology-solution-center/glyphosate-resistant-weed-problem-extends-more-species-more-farms

Environmental Risk Management Authority (ERMA) and latterly Environmental Protection Authority (EPA) – have approved experiments. There followed a succession of non-starters, failed experiments and breaches of controls, which have been reviewed in the report of the McGuinness Institute on transgenics in New Zealand over four decades. The independent 2013 Report recommends a moratorium on commercial release based on the evidence.[26]

An application for contained experiments with transgenic wheat made by Monsanto read: "Application for approval to field test (including large scale fermentation) in containment any genetically modified organism under Section 40 of the Hazardous Substances and New Organisms Act 1996."[27] Monsanto proposed to import and field test eleven new organisms as defined by its Roundup Ready® transgenic wheat (Triticum aestivum) tolerant to glyphosate. The wheat test plots were to be isolated from other crops by a 6-metre border planted to non-transgenic wheat which isolation barrier, said the application, is expected to minimize the spontaneous release of transgenic wheat pollen outside of the test plots.

AgResearch, a Crown Research Institute (CRI), has had approvals from ERMA (now EPA) to conduct research on transgenic cows, goats and mice. In June 2010, it and a subsidiary company announced they can improve white clover (Trifolium repens) to give grazing animals a higher intake of protein and reduce methane emissions. The Pastoral Genomics Research Consortium, a research consortium for forage enhancement through biotechnology, is researching a cisgenics approach to develop perennial ryegrasses that are drought resistant and reduce animal methane emissions. The use of a range of genetic engineering techniques brings risks that are not mitigated by describing an organism as 'cisgenic'.

Organic New Zealand[27] reported that CRIs have approvals for thousands of indoor laboratory experiments to create transgenic animals and plants. AgResearch has approval to engineer a wide range of forage legumes, grasses and vegetable plants in laboratory containment and glasshouses. In 2001 a HortResearch trial in Kerikeri on tamarillos genetically engineered to be resistant to mosaic virus ended after the Royal Commission on Genetic Modification recommended post-trial monitoring. In 2003, the Forest Research Institute, trading as Scion, gained approval to field trial transgenic pine and spruce trees carrying reproductive-altering and herbicide-resistant traits. In 2004, Crop and Food, with a subsidiary of Monsanto, Seminis, gained approval for a transgenic onion field trial. The onions were infested with thrips and the bulbs did not store well. The trial ended early. A 2006 application for garlic, onions, leeks and other alliums is on hold. In 2007, Crop and Food, now part of Plant and Food, received approval to trial transgenic brassicas (cauliflower, broccoli, cabbage, kale) that would produce an insecticide (Cry) gene. This trial breached regulatory controls after only four months when a flowering plant was discovered from unchecked regrowth. The breach was so serious that the CRI and MAF-Biosecurity NZ closed down the trial site.

No transgenic organisms from the foregoing experiments have been approved for release into the environment.[28]

2 What are the results of growing transgenic crops for two decades?

2.1 Field trial sites of transgenic canola in Tasmania

Monsanto Australia and Aventis (now Bayer CropScience) conducted field trials of transgenic canola in Tasmania in the late 1990s and 2000. In 2001, the Tasmanian Government decided to pursue agriculture free of genetically engineered organisms. The Office of the Gene Technology Regulator advises canola seeds can be viable for up to 16 years.[29] A Swedish study confirmed Tasmania's experience, finding transgenic canola seed can remain viable in the wild even 10 years after release.[30] Management issues of the 57 Tasmanian sites included seed persistence.

Regular audits of sites have taken place. In May 2013, 53 sites were inspected, four having canola volunteers. In 2008, volunteers were found at twelve of the 53 sites,[31] twelve different sites to the 2013 audit. An audit in May 2014 showed volunteer canola plants at three former trial sites.[32] Over half the 2013 sites had not involved recent soil disturbance and

[26] http://mcguinnessinstitute.org/Site/Publications/Project_Reports.aspx. 'An Overview of Genetic Modification in New Zealand 1973-2013: The first forty years' published in August 2013.
[27] http://organicnz.org.nz/node/571
[28] http://www.epa.govt.nz/new-organisms/popular-no-topics/Pages/GM-field-test-crop-and-ornamental-plants.aspx
[29] Former GE Canola Trial Sites Audit Reports, Dept Primary Industries http://www.dpipwe.tas.gov.au/internnsf/WebPages/CART-6795X9?open
[30] 'Long-term persistence of GM oilseed rape in the seedbank', D'Hertefeldt T et al, *Biol Lett.* 23 June 2008; 4(3): 314–317. www.ncbi.nlm.nih.gov/pmc/articles/PMC2610060/.
[31] http://safefoodfoundation.org/contamination-from-field-trials-in-tasmania/

it is acknowledged that these will have dormant canola seed in the soil that will not germinate until soil disturbance takes place. During audits, nearby roadsides and other areas are inspected to ensure containment is being achieved. Germinating canola volunteers not located would provide further potential contamination.

This management protocol has been strengthened with a recent decision for an indefinite moratorium on the release of transgenic organisms into the environment to protect Tasmania's brand and export economy.[33] Australian farmers growing conventional canola regularly secure a higher price for their crops. A list of countries that ban transgenic crops and/or require food labelling for any transgenic element can be found on http://naturalrevolution.org/list-of-countries-that-ban-gmo-crops-and-require-ge-food-labels/.

2.2 US farmers are using more hazardous pesticides to fight contaminated weeds

Dr Charles Benbrook is a research professor at the Centre for Sustaining Agriculture and Natural Resources at Washington State University. In a recent study, he found genetically engineered crops have led to an increase in overall pesticide use by 404 million pounds from the time they were introduced in 1996 through to 2011. This has aided in the appearance of the so called 'superweeds': "*Contrary to often-repeated claims that today's genetically-engineered crops have, and are reducing pesticide use, the spread of glyphosate-resistant weeds in herbicide-resistant weed management systems has brought about substantial increases in the number and volume of herbicides applied. If new genetically engineered forms of corn and soybeans tolerant of 2,4-D are approved, the volume of 2,4-D sprayed could drive herbicide usage upward by another approximate 50%.*"[34]

3 Genetically engineered crops vs conventional non-transgenic crops

The loss of genetic diversity is an acknowledged fact in commercially important crops. Despite crops being bred for superior resistance, the current practice of genetic uniformity and monoculture increases the possibility of pests and diseases evolving to overcome a host plant's resistance.

Transgenic crops were introduced with promises that they would overcome many of today's agricultural problems. However, scientists cannot easily quantify the exact effect/s novel organisms will have when released into the environment; each one may differ to the next. Genes move naturally within a species, by seed dispersal and pollination, a basic biological principle of plant evolution facilitated by insects, wind, animals, humans and other factors. The ecological risks in releasing transgenic plants include non-target effects of a crop and transgenic DNA escaping into wild populations.[35]

An estimated 90 percent of transgenic crops grown worldwide are glyphosate resistant.[36] US Department of Agriculture data show glyphosate-based herbicide use increased 6,504% 1991-2010. In a survey of growers, Farm Chemicals International confirmed (February 2013):[37]

- 61.2 million US crop acres have glyphosate-resistant weeds, nearly double the 2010 number;
- 49% of growers had glyphosate-resistant weeds on farms in 2012, up from 34% in 2011;
- 92% of growers in Georgia have glyphosate-resistant weeds;
- from 2011 to 2012 the acres with resistance almost doubled in Nebraska, Iowa and Indiana;
- total resistant acres increased by 25% in 2011 and 51% in 2012;
- more farms had at least two resistant species on their farm - in 2010 12%, in 2012 27%.

Graphs 15, 16 and 17 on the International Survey of Herbicide-Resistant Weeds illustrate the spread of glyphosate-resistant weeds since the introduction of transgenic crops. Click on http://www.weedscience.org/summary/home.aspx and scroll down to click on 'PowerPoint Charts Available for Download – December 6th 2014'.

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[32] Dept Primary Industries, Parks, Water & Environment – Biosecurity Tasmania.
http://dpipwe.tas.gov.au/Documents/GM%20Canola%20Former%20Trial%20Sites%20Audit%20Report%20May2014.pdf
[33] http://www.abc.net.au/news/2014-01-09/tasmania27s-gmo-ban-extended-indefinitely/5192112
[34] http://www.nlpwessex.org/docs/benbrook.htm.
[35] 'Ecological effects of transgenic crops and the escape of transgenes into wild populations', Pilson D and Prendeville, H, Annu. Rev. Ecol. Evol. Syst. 2004. 35:149–74
http://fbae.org/2009/FBAE/website/images/PDF%20files/Imporatant%20Publication/ecological%20effects%20of%20transgenes.pdf
[36] Powles (2008) Glyphosate: a once-in-a-century herbicide, Pest Manag Sci 64: 319-325
[37] http://www.farmchemicalsinternational.com/crop-inputs/herbicides/glyphosate-resistance-spreads-in-the-u-s/ 5 February 2013

Herbicide-resistance is not confined to glyphosate-based herbicides. One study predicts total herbicide use in the US will rise from around 1.5 kilograms per hectare in 2013 to more than 3.5 kilograms per hectare in 2025 as a direct result of growing transgenic crops, and that the new technologies will also lose their effectiveness.[38] As indicated, the increase in herbicide-resistant weeds species has led to the development of GE crops and weeds that are resistant to more toxic herbicides such as 2,4-D.

In August 2012, conventional farmer, Bob Mackley, spoke in New Zealand about transgenic crops and their effects in his native Australia. He reported that many farmers have suffered significant losses as a result of transgene contamination of their conventional crops, and legislation favours seed companies, not farmers. Legally without the means to protect his livelihood, Mackley has been forced to time his plantings to avoid contamination from transgenic crops grown by a neighbour. His is a critical balance between profit or contamination and loss.

Most growers in Australia are GE-free and support the GE Crops Free Areas Act 2003 which came into currency in 2014. They want the biotechnology industry to pay its way, with a Farmer Protection Fund levying 50cents/kg on seed sales so growers are compensated for losses from GE contamination. GE-free canola premiums are up to $40/tonne.[39]

US farmers growing transgenic corn say they now face a future of lower prices and higher inputs. The trend is to abandon transgenic seed because non-GE crops are more productive and profitable.[40]

There already exist effective, sustainable solutions to the problems that this novel technology claims to address; for example, conventional plant breeding, helped by safe modern technologies like gene mapping and Marker Assisted Selection. MAS moves complex traits into new crop varieties using genetic information and conventional breeding, raising fewer safety issues than transgenic crops and respecting species barriers. It is more acceptable to shoppers and faster to market. MAS continues to outperform genetically engineered crops in producing high-yield, drought-tolerant, and pest- and disease-resistant plants that can meet present and future food needs.[41] [42]

Key markets want foods free of novel DNA, a requirement driven by the demands of well-informed and discerning consumers from China, Japan, Europe, the US and elsewhere. The global market for foods and beverages produced without the use of any transgenic ingredient/s has led many leading international food companies such as Unilever, Nestlé, and Coca-Cola to introduce or be developing non-GE versions of their products to meet the demands of consumers who do not want transgenes in their food.[43] Global sales of non-GE food and beverage products are predicted to double to US$800 billion by 2017.[44]

4 Genetically engineered crops and human health

Consumers in the US have been ingesting significant quantities of foods containing novel DNA since the introduction of transgenic crops on a commercial basis in the mid 1990s. About 94 percent of US soybean farmers and 72 per cent of corn farmers use Roundup Ready (glyphosate-resistant) crops. Soy and corn go into a substantial range of food products, along with transgenic canola and cottonseed.[45] In addition, animals fed glyphosate-resistant crops bio-accumulate[46] glyphosate and/or glyphosate metabolites, adding to the human end user intake.

Glyphosate-resistant transgenic crops especially represent a large percentage of the transgenic seed market; for example, in the US alone, nearly 93 percent of soybeans and 80 percent of corn came from Monsanto's RoundupReady seeds in 2009.[47] Glyphosate is the active ingredient in Roundup and many proprietary herbicides and since the introduction in the mid-1990s of glyphosate-resistant crops on a commercial basis its use has increased many-fold.

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[38] Mortensen et al, BioScience 62, 75–84 (2012). http://www.jstor.org/discover/10.1525/bio.2012.62.1.12?uid=3738776&uid=2129&uid=2&uid=70&uid=4&sid=21103352335931

[39] Gene Ethics Oz

[40] http://modernfarmer.com/2013/12/post-gmo-economy/.

[41] 'An evidence-based examination of the claims made for the safety and efficacy of genetically modified crops' (June 2012) Earth Open Source http://earthopensource.org/index.php/reports/58

[42] Gene Ethics News | December 2014

[43] http://www.packagedfacts.com/Non-GMO-Foods-7822141/.

[44] www.environmentalleader.com/2013/11/12/non-gmo-food-market-to-hit-800-billion-by-2017/; www.globalresearch.ca/american-farmers-abandoning-genetically-modified-seeds-non-gmo-crops-are-more-productive-and-profitable/5366365; Global Research, 27 Jan 2014 offthegridnews.com.

[45] http://www.soyconnection.com/soyfoods/product_overview.php

[46] http://extoxnet.orst.edu/tibs/bioaccum.htm, http://www.saferchemicals.org/resources/chemicals/pbts.html

[47] http://www.foodandwaterwatch.org/factsheet/monsanto-a-corporate-profile/

The negative impacts of glyphosate ingestion on humans manifest slowly over time by damaging cellular systems, playing a part in most common diseases and conditions allied with a Western diet, including gastrointestinal disorders, obesity, diabetes, heart disease, depression, autism, infertility, cancer and Alzheimer's disease.[48]

A huge increase in the prevalence of chronic diseases in the US has been reported over the past 20 years. For a 2014 study, US government databases were searched for transgenic crop data, glyphosate application data and disease epidemiological data. Correlation analyses were then performed on 22 diseases in these time-series data sets. While correlation is not proof of certain cause, the researchers produced graphs suggesting a connection between the introduction of genetically engineered crops on a commercial basis and increases in those diseases.[49]

A 2013 study detected glyphosate in 43.9 percent of human urine samples taken from participants living in urban areas in 18 European countries.[50] [51] When diets favoured organic produce humans excreted significantly less glyphosate. The levels in urine of generally healthy humans were significantly lower than levels in a comparative chronically diseased population.

In the 1970s, glyphosate was identified as a chelator of minerals, a compound that combines with other minerals making them available only under certain conditions. Studies show plant uptake systems are susceptible to the chelating effects of glyphosate[52] which will affect the quality of crops and grasses, as well as making them more susceptible to pathogens.

One study[53] hypothesizes glyphosate mixed with hard water forms a complex with heavy metals like cadmium, resulting in its accumulation in the body. The study proposed a link between chronic kidney disease and glyphosate. Chronic kidney disease of unknown origin (CKDu) is increasingly common in poor farming communities in some developing countries. Identified in the mid-1990s, CKDu is estimated to afflict 15 percent of working age people in northern Sri Lanka alone: 400,000 patients with an estimated death toll of 20,000.

There remains no official monitoring of effects on the human population of ingesting transgenic foods and consumers have no official notification of the risks related to commercial transgenic crops. With US consumers increasingly growing aware of the potential results of ingesting transgenic DNA, the fastest growing sector in its grocery industry is for foods free of transgenes, that sector now estimated to be at close to one third of the total market. This is the result of consumer pressure, and from medical professionals recommending foods free of transgenes with consequent improved health for patients.[54] New Zealand is still well-positioned to help meet that demand for GE-free food.

4.1 Genetically engineered organisms - no proof of safety for consumers or farmers

The 2014 'Hot Debate' at Lincoln University, featured six experts representing those proposing and those against the release of into the environment of genetically engineered organisms. Panel members Dr Jon Hickford and Dr Tony Connor, proponents of the technology, stated transgenic foods were safe to eat. They were asked (a) could they provide 10 human studies to support this statement, and (b) would they also advise where the diagnostic tools are available for health professionals to identify if transgenic foods in the human diet are contributing or not to illnesses. Drs Hickford and Conner admitted there are no safety studies nor are there any diagnostic tools for monitoring public health impacts of transgenic foods.[55]

Because of the controversy that follows the safety issues an extensive three-year study is to ask, *Is genetically engineered food and associated pesticides safe for human health*? Launched on 12 November 2014, it is the largest ever, independent safety study on transgenic foods.[56]

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[48] 'Glyphosate's Suppression of Cytochrome P450 Enzymes and Amino Acid Biosynthesis by the Gut Microbiome: Pathways to Modern Diseases', Samsel et al, Entropy 2013, 15(4), 1416-1463; doi:10.3390/e15041416 http://www.mdpi.com/1099-4300/15/4/1416

[49] 'Genetically engineered crops, glyphosate and the deterioration of health in the United States of America', Swanson et al, Journal of Organic Systems, 9(2), 2014, http://www.organic-systems.org/journal/92/JOS_Volume-9_Number-2_Nov_2014-Swanson-et-al.pdf

[50] 'Determination of Glyphosate residues in human urine samples from 18 European countries', carried out by Medical Laboratory Bremen, Germany, http://www.foeeurope.org/sites/default/files/glyphosate_studyresults_june12.pdf.

[51] http://www.foeeurope.org/sites/default/files/press_releases/foee_1_introducing_glyphosate.pdf

[52] Roemheld et al., 2005; Neumann et al., 2006; Eker et al., 2006

[53] 'Glyphosate, hard water and nephrotoxic metals: are they the culprits behind the epidemic of chronic kidney disease of unknown etiology in Sri Lanka?' Jayasumana C1, Gunatilake S2, Senanayake P3. Int J Environ Res Public Health. 2014 Feb 20;11(2):2125-47. doi: 10.3390/ijerph110202125. http://www.ncbi.nlm.nih.gov/pubmed/24562182

[54] http://www.aaemonline.org/gmopost.html.

[55] http://www.scoop.co.nz/stories/PO1404/S00063/myths-revealed-about-safety-of-ge-food.htm.

[56] http://www.gmwatch.org/index.php/news/archive/2014/15753-largest-international-study-into-safety-of-gm-food-launched-by-russian-ngo

Rats are to be fed Monsanto RoundUp Ready corn and glyphosate, which the corn is engineered to resist and which is widely used in growing such crops. The use of the herbicides to which transgenic crops are resistant has increased many-fold since their introduction in the mid-1990s and there is a notable lack of published, peer-reviewed independently sourced data on their safety and on the increased use of the herbicides. For the most part, biotechnology companies carried out safety studies and those claimed 'no health risk'. Government regulators have not required evidence of long-term safety. This study should fill that gap. The experiment will be conducted in Western Europe and Russia and have no input from biotechnology corporations or the anti-genetic engineering movement.

In Alliance for Bio-Integrity et al v Shalala (1998) over 44,000 pages of files produced at the direction of the Court by the US Food and Drug Administration (FDA) revealed it had declared genetically engineered foods to be safe despite its own experts disagreeing, and that it falsely claimed a broad scientific consensus supported its stance. Internal memoranda and reports disclosed agency scientists repeatedly cautioned that foods produced through recombinant DNA technology (genetically engineered organisms) entail different risks than do their conventionally produced counterparts and that this was consistently disregarded when FDA policy was written in treating transgenic foods the same as conventional ones.[57]

In taking this stance, the agency violated the US Food, Drug and Cosmetic Act in allowing transgenic foods to be marketed without testing on the premise that they are 'generally recognized as safe' (GRAS) by qualified experts. The consensus of scientists working for the FDA was that transgenic foods were inherently risky, and might create hard-to-detect allergies, poisons, gene transfer to gut bacteria, new diseases, and nutritional problems. They urged rigorous long-term tests.[44] The FDA has admitted to being directed "to foster" the biotech industry. After two decades of growing transgenic crops on a commercial-scale results to the environment and consumers unknowingly ingesting transgenes are becoming obvious.

5 New Zealand exports – are we 100% Pure Clean Green New Zealand?

The Parliamentary Commissioner for the Environment, Dr Jan Wright, says New Zealand urgently needs a National Environmental Reporting Act if it is to maintain its clean green image. The act would provide for regular national environmental reporting in line with other OECD nations, New Zealand being the only OECD country not doing so.[58]

One of New Zealand's export strengths is being able to guarantee products free of genetically engineered organisms. New Zealand's position as a provider of clean, GE-free, and safe food is a significant economic and marketing point of difference. In the task of lifting exports above commodity status, there is added value in food safety, natural, uncontaminated foods, and sustainable, ethical production. One of the major emerging growth sector in US grocery is Non-GEO food; as stated, close to one third of the market.

Exclusion of GE crops now advantages New Zealand and assists in increasing exports to markets wanting products free of transgenic DNA and in supplying new markets. Our regulatory system has protocols in place aimed at protecting these exports. For example, exported meat has to comply with the standards applying to cadmium levels in liver or kidney, particularly from animals older than three years.[61] Because of the known chelating qualities of glyphosate, growing glyphosate-resistant transgenic crops could increase the cadmium presence in animal feed. Cadmium levels can affect stock grazed on transgenic crop stubble and the mineral may be present in imported animal feed.

Genetically engineered soy enters through New Zealand's seaports, mainly from Argentina. The large poultry industry in the Waikato and elsewhere uses transgenic feed and our substantial dairy industry spreads poultry manure on mainly dairy farms at 1-2 tonnes/hectare as a fertiliser. Any glyphosate-resistant gene would contaminate the environment and the milk as will the glyphosate-based herbicide contained therein. The spreading of manure then provides the opportunity to widely distribute any potentially viable transgenic material and associated chemical residues. Currently, transgenic crops are included in near 200,000 tonnes of feed imported into New Zealand annually. These imported feeds are only tested for non-viability of transgenic crops with no quality reassurance on purity. The reported practice is that loads are largely assessed visually rather than tested in a laboratory. Neither the glyphosate content, nor other toxic ingredients in glyphosate-based herbicides are tested for and the Ministry for Primary Industries confirmed they will not be in the immediate future. Thus New Zealand is at risk potentially from both the transgenic content and the glyphosate-based herbicide residues contained in the feed, the levels of which are also not monitored.

57 Alliance for Bio-Integrity http://www.biointegrity.org/list.htm.
58 http://www.pce.parliament.nz/media/media-releases/our-clean-green-image-at-risk-says-commissioner

It was a Norwegian study that investigated contamination levels and nutritional contents of three varieties of Iowa-grown soybeans[59] - Roundup Ready soybeans, conventional soybeans grown using Roundup herbicide, and organic soybeans, grown without agricultural chemicals. On average transgenic soy contained 11.9 parts per million (ppm) of glyphosate; the highest level 20.1 ppm. No residues of either kind were found in the conventional and organic varieties. In a 2012 nutritional analysis of transgenic corn 13 ppm of glyphosate were found, compared to none in non-GEO corn. In an article for *The Ecologist* two of the study's researchers pointed out that these levels are actually double or more of what the developer of Roundup Ready transgenic crops, Monsanto, has referred to as "extreme levels:"

The question has to be asked, why is New Zealand importing any product likely to be contaminated with novel DNA and glyphosate when there are countries exporting conventional crops? Brazilian feed is free of transgenes, and there is enough to meet demand and an increasing supply. Soya production in China and India is 100% non-transgenic.

A recent privately tested sample of soy meal imported into New Zealand revealed 3.4 parts per million glyphosate and 1.4 parts per million AMPA (aminomethylphosphonic acid), the primary degradation product of glyphosate in plants, soil, and water. Stock fed such feed will ingest any viable transgenes that escape scrutiny, and pesticide residues, and can potentially pass the effects on to humans ingesting their meat or milk products.[3] That such feed is not adequately tested or labelled undermines the integrity of the New Zealand food system and consequently its export reputation.[60]

Russia recently announced it will not allow any seed or food containing transgenes into Russia, that the country has the land to grow its own conventional, organic foods, as does New Zealand. The Technical Expert Panel of India's Supreme Court has also backed an indefinite moratorium on GEOs. Japan opposes transgenic crops, although canola imported from Canada has led to transgenic volunteers growing wild around Japanese ports and roads leading to major food oil processing companies. Ireland bans all GE crops. Austria, Hungary, Greece, Bulgaria and Luxembourg have bans on the cultivation and sale of GEOs. Germany bans the cultivation or sale of GE maize. In France public demand has successfully kept transgenic crops out of the country. Madeira has a countrywide ban on GE crops. Switzerland banned all GE crops, animals, and plants on its fields and farms in a public referendum in 2005, extended to 2013, and further extended to December 2017.[61] Californian counties Mendocino, Trinity and Marin have banned GE crops, and a number of US States are working towards at least adequate labelling to give consumers a choice.[62] [63]

Alongside banning transgenic crops, countries are banning glyphosate, as evidence grows that it s not safe as was conveniently assumed by regulators and industry. Glyphosate is the active ingredient in Monsanto's proprietary herbicide, Roundup®, and an ingredient in proprietary brands marketed by Bayer, Dow, Zeneca and other transnational companies.[64] With an estimated 90 percent of transgenic crops grown worldwide being glyphosate-resistant, the trait has transferred to weeds, with glyphosate-resistant weeds now located in 18 countries. These have had particularly significant impacts in the US, Australia, Brazil, Argentina and Paraguay.[65]

Glyphosate-resistance has been confirmed in several New Zealand locations, the cause here given as "over application" of the herbicide.[66]

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[59] 'Compositional differences in soybeans on the market: Glyphosate accumulates in Roundup Ready GM soybeans', Bøhna et al, Food Chemistry, Volume 153, 15 June 2014, Pages 207–215doi:10.1016/j.foodchem.2013.12.054
http://www.sciencedirect.com/science/article/pii/S0308814613019201

[60] In New Zealand, the maximum concentrations of a residue (MRLs) - resulting from the registered use of an agricultural or veterinary chemical legally permitted or recognised as acceptable in or on a food, agricultural commodity, or animal feed - are established by the Agricultural Compounds and Veterinary Medicines Group (ACVMG) within the NZ Food Safety Authority. There is no glyphosate MRL for maize currently listed in the MRL Standard; however, there is a provision for residues of up to 0.1 mg/kg for agricultural compound/food combinations not specifically listed. The Standard does recognise Codex standards for imported food. The Codex MRL for glyphosate in maize is 5 mg/kg (the residue definition only includes parent glyphosate). Under Food Standards ANZ, the current ADI for glyphosate of 0.3 mg/kg body weight per day set in 1985[60] based on the no observed effect level (NOEL) of 30 mg/kg bw/day, the highest dose tested in a two year study on rats, and using a 100-fold safety factor (10-fold intra and interspecies safety factors). There is currently no ADI for NAG, AMPA or N-acetyl AMPA. The FAO estimate of acceptable daily intake for humans is 0-0.3 mg/kg bw (sum of glyphosate and AMPA) (1986) http://www.fao.org/docrep/w8141e/w8141e0u.htm

[61] http://www.gmo-free-regions.org/gmo-free-regions/switzerland.html

[62] http://naturalrevolution.org/list-of-countries-that-ban-gmo-crops-and-require-ge-food-labels/ 19 June 2013

[63] http://www.gmo-free-regions.org/

[64] http://en.wikipedia.org/wiki/Glyphosate.

[65] International Survey of Herbicide Resistant Weeds www.weedscience.org/graphs/soagraph.aspx (2013).

[66] http://www.far.org.nz/index.php/media/entry/glyphosate-resistance-confirmed-in-new-zealand.

A January 2014 Press Release from the biotechnology company, Dow AgroSciences[67], stated new data "indicate an astonishing 86 percent of corn, soybean and cotton growers in the South (*of the US*) have herbicide-resistant or hard-to-control weeds on their farms. The number of farmers impacted by tough weeds in the Midwest ... now tops 61 percent. Growers need new tools to address this challenge." The "new tools" are their transgenic crops and associated more toxic agricultural proprietary chemicals.

Growing transgenic crops would have negative impacts on the New Zealand environment, agricultural industries and on exports and tourism. Conventional and organic farmers in New Zealand already achieve premiums for non-transgenic food products. If New Zealand grew genetically engineered crops, many export markets would be adversely affected. (NB As an example, see grain and seed exports page 4.)

5.1 Remaining 'GE free'

The Inter-Council Working Party (ICWP) sought legal advice and has placed precautionary statements in their Plans to protect their communities and regions. An ICWP-commissioned independent poll showed how necessary this was. See this on http://www.wdc.govt.nz/PlansPoliciesandBylaws/Plans/Genetic-Engineering/Pages/default.aspx.

Community opinion was confirmed in December 2013 when a national poll by Colmar Brunton, undertaken for Pure Hawke's Bay, showed 79% of New Zealanders support Councils being able to use the RMA to protect farmers, exporters and their residents from the long-term unmanaged and unknown risks of genetically engineered organisms. The risks include exposure to increasingly more toxic chemicals.[68]

The UN's science-based International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) states mixed approaches to agriculture, not transgenic monocultures, are needed to feed future generations. Systems should enhance sustainability and maintain productivity in ways that protect the natural resource base and ecological provisioning of agricultural systems.[69]

Reports from qualified bodies on transgenic organisms include New Zealand's own McGuiness Institute, a privately funded, non-partisan think tank working for a sustainable future, contributing strategic foresight through evidence-based research and policy analysis.[26] Ten years after the New Zealand moratorium on genetic engineering ended, an Institute study suggests it is time for it to be reinstated and time for a strategy to benefit the economy as a producer of food free of transgenic DNA for the world market. The Institute found that despite huge investment in experiments on transgenic plants and trees, there has been little benefit and significant economic risk incurred. Protecting the value of New Zealand's status as a producer of safe, high quality food, is of national strategic importance.

The 'United Nations Conference on Trade and Development Review 2013 - Make agriculture truly sustainable now for food security in a changing climate'[70] states:

"Developing and developed countries alike need a paradigm shift in agricultural development: from a 'green revolution' to a 'truly ecological intensification' approach. This implies a rapid and significant shift from conventional, monoculture-based and high external-input-dependent industrial production towards mosaics of sustainable, regenerative production systems that also considerably improve the productivity of small-scale farmers. We need to see a move from a linear to a holistic approach in agricultural management, which recognizes that a farmer is not only a producer of agricultural goods, but also a manager of an agro-ecological system that provides quite a number of public goods and services (e.g. water, soil, landscape, energy, biodiversity, and recreation)."

An evidence-based examination of the claims made for the safety and efficacy of transgenic crops was published in June 2012 http://earthopensource.org/files/pdfs/GMO_Myths_and_Truths/GMO_Myths_and_Truths_1.3b.pdf.

See also FAQ on Genetic Engineering http://www.psgr.org.nz/index.php?option=com_content&view=article&id=54&Itemid=25 and an overview on Glyphosate http://www.psgr.org.nz/glyphosate/finish/8-uncategorised/16-glyphosate/0.

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[67] http://www.agriculture-xprt.com/news/dow-agrosciences-statement-about-usda-announcement-regarding-draft-environmental-impact-statement-fo-409452

[68] http://purehawkesbay.org/overwhelming-support-for-local-decisions-on-gm-free-status-national-poll/

[69] http://www.greenpeace.org/belgium/PageFiles/16954/iaastd-recommendations.pdf

[70] http://unctad.org/en/PublicationsLibrary/ditcted2012d3_en.pdf.

5.2 Future agricultural planning for New Zealand

Plant breeding largely favours varieties determined by the vested interest providing funding rather than on end user safety and choice. A current favourite is genetic engineering technology which includes the development of transgenic food crops, and many of these food crops are resistant to herbicides, especially glyphosate. Important points are that:

(a) Such crops substantially increase the amount of herbicide applied to the crop;
(b) The novel DNA giving herbicide-resistance has transferred to an increasing number of major weed species in areas growing transgenic crops;
(c) This has made glyphosate in particular ineffectual on those resistant weeds; and
(d) Weed species now require more toxic chemicals to achieve eradication.[35]

Glyphosate-resistance has already been identified in several locations in New Zealand, the cause being given as 'over application'.[71] On experience overseas, growing transgenic glyphosate-resistant crops would increase that considerably.

Two studies give further evidence-based reasons for New Zealand farmers taking a precautionary approach and not adopting genetically engineered crops and thus releasing novel DNA into the environment, particularly those crops using glyphosate-based herbicides[72]:

- Thirty dairy cows from each of eight Danish dairy farms were investigated and all were found to excrete glyphosate in their urine. The study demonstrated that glyphosate is toxic to the normal metabolism of dairy cows.[73] The likely source of the glyphosate would be animal feed containing transgenic food and/or feed crops, and residual glyphosate from spraying. (N.B. See page 8 - glyphosate found in human urine.)

- Glyphosate enhances the growth of aflatoxin-producing fungi, lending an explanation for the substantial increase in fungal toxins now found in corn grown in the US[74]; the USDA indicating in 2012 that 88 percent of US corn/maize grown was transgenic. Most would be glyphosate resistant, thus increasing the potential for large areas of corn crops to be affected.[75]

  Aflatoxins affect grains, oilseeds and tree nuts, among other crops. Contamination of grains by aflatoxins threatens human and livestock health, and international trade. The UN Food and Agriculture Organisation estimates 25% of the world food crops are affected annually. Crop loss due to such contamination costs US producers over US$100 million/year on average.[76] Tate & Lyle, a British maker of sweeteners and starches, has said quality problems with US corn, primarily due to aflatoxin, were forcing changes to the firm's buying programme.[77]

Thousands of conventional crop varieties have been lost since the introduction of agrichemicals and monoculture practices, including transgenic food crops since the mid 1990s.[78] Changes in genetic structure can be long term and affect several generations. No insurer will cover the complex and long-term risks, this fact alone reason for precaution.

If transgenic crops are introduced into New Zealand, many of our farmers growing premium quality and organic crops stand to lose their livelihoods. There will follow, as it has in other countries, inadvertent contamination of non-transgenic crops and grasses, resulting in extortionist claims from the seed producers for farmers to compensate them for harbouring – be it unwillingly and unknowingly – crops contaminated with patented novel DNA. Farmers have no legal protection against this and insurance protection is not available. The end result for many has been financial ruin.[79]

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[71] http://www.far.org.nz/index.php/media/entry/glyphosate-resistance-confirmed-in-new-zealand.
[72] The active ingredient in the commonly applied herbicide, Roundup. Glyphosate-resistant crops are largely RoundupReady.
[73] 'Field Investigations of Glyphosate in Urine of Danish Dairy Cows', Krüger et al., J Environ Anal Toxicol 2013, 3:5, http://dx.doi.org/10.4172/2161-0525.1000186
[74] Carla L Barberis, Cecilia S Carranza, Stella M Chiacchiera, Carina E Magnoli. Influence of herbicide glyphosate on growth and aflatoxin B1 production by Aspergillus section Flavi strains isolated from soil on in vitro assay. J Environ Sci Health B. 2013 ;48(12):1070-9. PMID: 24007484
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[76] http://www.icrisat.org/aflatoxin/aflatoxin.asp.
[77] Reuters, 'Tate & Lyle says aflatoxin in U.S. corn complicates grain sourcing', 8 November 2012
[78] Int Fed of Red Cross and Red Crescent Societies, http://www.ifrc.org/PageFiles/89755/Photos/307000-WDR-2011-FINAL-email-1.pdf.
[79] Report 'Seed Giants vs US Farmers' http://www.centerforfoodsafety.org/reports/1770/seed-giants-vs-us-farmers

6 Concluding

Tasmanian Deputy Premier, Bryan Green, said the State's "island status and our biosecurity system mean that our food and agricultural industries are well placed to take advantage of the State's GE-free status."[80]

New Zealand's island status offers the same advantages. This country should reject growing transgenic food or feed crops, trees and grasses; in fact, any release into the environment of genetically engineered organisms. Transgenes released into the environment have the potential to invade and damage the biological infrastructure of New Zealand's primary industry sectors and our unique biodiversity. As has been shown overseas, once released into the environment, transgenes will spread and potentially contaminate irreversibly native and domestic gene-stocks alike.

6.1 Supporting ethical science

PSGR acknowledges there may be potential benefits of genetic engineering technology and supports continued advances in molecular biology, which is the underlying science, in containment. We are critical of the business models and regulatory systems that have characterized early applications of the various technologies involved.

Transgenic applications in agriculture have made the problems of industrial monoculture cropping worse and do not support a sustainable agriculture and food system with broad societal benefits. The technologies have been employed in ways that reinforce problematic industrial approaches to agriculture.

Policy decisions about the use of genetic engineering technologies are too often driven by public relations campaigns run by the biotechnology industry, rather than by what science tells us about the most cost-effective ways to produce abundant food and preserve the health of farmland.

We offer these following ideas for policy makers on what they should do to best serve the public interest:

- Expand research funding for public crop breeding programmes, so that a broad range of non-transgenic varieties remain available;
- Expand public research funding and incentives to further develop and adopt agro-ecologically based farming systems;
- Take steps - such as changes in patent law - to facilitate independent scientific research on the risks and benefits of genetic engineering technology / genetically engineered organisms;
- Take a more rigorous, independently verified approach to transgenic product approvals, so that products do not come to market until their risks and benefits are understood through non-biased review;
- Support food labelling laws that require foods containing transgenic-derived ingredients to be clearly identified as such, so that consumers can make informed decisions about supporting transgenic applications in agriculture.

PSGR supports fully contained, supervised use of genetically engineered technology for the furtherance of science.

PSGR does not gain an advantage in trade competition.

Compiled by Physicians and Scientists for Global Responsibility New Zealand Charitable Trust
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[80] http://www.theguardian.com/world/2014/jan/09/tasmania-gm

For background and further information please refer to the following:

- Testimony to Northland Regional Council 21 June 2013 http://www.psgr.org.nz/testimonies
- Letters to New Zealand Councils and to members of Federated Farmers to be found on www.psgr.org.nz > home page > letters.
- Frequently Asked Questions on Genetic Engineering www.psgr.org.nz/index.php?option=com_content&view=article&id=54&Itemid=25
- Frequently Asked Questions on Glyphosate http://www.psgr.org.nz/glyphosate/finish/8-uncategorised/16-glyphosate/0

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Inter-council Working Party on GMO Risk Evaluation and Management Options
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Whangarei District Council on Genetic Engineering
www.wdc.govt.nz/PlansPoliciesandBylaws/Plans/Genetic-Engineering/Pages/default.aspx#Expand

Far North District Council on Genetically Modified Organisms / Genetic Engineering
http://www.fndc.govt.nz/services/environmental-policy-and-forward-planning/the-far-north-district-plan/genetically-modified-organisms-gmo#a2

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www.radio nz.co.nz/news/national/229508/79-percent-want-councils-to-have-power-over-gm-crops-poll

Genetic Engineering and Sustainable Agriculture – New Zealand
http://www.greenpeace.org/new-zealand/en/campaigns/genetic-engineering/

The Sustainability Council of New Zealand http://www.sustainabilitynz.org/council.asp

GE Free New Zealand www.gefree.org.nz/

See also

GM Watch - GM Contamination Register http://www.gmcontaminationregister.org/

The ETC Group – 'Who Owns Nature' http://www.etcgroup.org/content/who-owns-nature

The International Survey of Herbicide Resistant Weeds on http://www.weedscience.org/In.asp nd
Up-to-date list of herbicide-resistant weeds on http://www.weedscience.org/summary/MOASummary.asp

Seeds Of Death, Full Movie https://www.youtube.com/watch?v=eUd9rRSLY4A May 24, 2013

The socio-economic effects of GMOs Hidden costs for the food chain' December 2010, Friends of the Earth Europe.
http://www.foeeurope.org/sites/default/files/publications/FoEE_Socio_economic_effects_gmos_0311.pdf

Appendix 1

Because of the disproportionate influence of 'big business' in governmental decision-making, policies have largely favoured the interests of industry, often with a seeming disregard for the wishes or safety of private citizens and the environment. This situation has given rise to strong public reaction and the need for controls outside of Regulatory Authorities to protect the interests of local communities and future generations.

On 12 November 2014, an Open Letter from those in North America with direct experience of the commercial release of genetically engineered organisms was released on line to the UK and Europe, and published in *The Ecologist*.[81] Their first-hand experience should influence decisions made in other jurisdictions including in New Zealand. They said:

We are writing as concerned American citizens to share with you our experience of genetically modified (GM) crops and the resulting damage to our agricultural system and adulteration of our food supply. In our country, GM crops account for about half of harvested cropland. Around 94% of the soy, 93% of corn (maize), and 96% of cotton grown is GM.[i]

The UK and the rest of the EU have yet to adopt GM crops in the way that we have, but you are currently under tremendous pressure from governments, biotech lobbyists, and large corporations to adopt what we now regard as a failing agricultural technology.

Polls consistently show that 72% of Americans do not want to eat GM foods and over 90% of Americans believe GM foods should be labelled.[ii] In spite of this massive public mandate, efforts to get our federal[iii] and state[iv] governments to better regulate, or simply label, GMOs are being undermined by large biotech and food corporations with unlimited budgets[v] and undue influence.

As you consider your options, we'd like to share with you what nearly two decades of GM crops in the United States has brought us. We believe our experience serves as a warning for what will happen in your countries should you follow us down this road.

Broken promises

GM crops were released onto the market with a promise that they would consistently increase yields and decrease pesticide use. They have done neither.[vi] In fact, according to a recent US government report, yields from GM crops can be lower than their non-GM equivalents.[vii]

Farmers were told that GM crops would yield bigger profits too. The reality, according to the United States Department of Agriculture, is different.[viii] Profitability is highly variable, while the cost of growing these crops has spiraled.[ix]

GM seeds cannot legally be saved for replanting, which means farmers must buy new seeds each year. Biotech companies control the price of seeds, which cost farmers 3-6 times more than conventional seeds.[x] This, combined with the huge chemical inputs they require, means GM crops have proved more costly to grow than conventional crops.

Because of the disproportionate emphasis on GM crops, conventional seed varieties are no longer widely available leaving farmers with less choice and control over what they plant.[xi]

Farmers who have chosen not to grow GM crops can find their fields contaminated with GM crops as a result of cross pollination between related species of plants[xii] and GM and non-GM seeds being mixed together during storage.

Because of this our farmers are losing export markets. Many countries have restrictions or outright bans on growing or importing GM crops[xiii] and as a result, these crops have become responsible for a rise in trade disputes when shipments of grain are found to be contaminated with GM organisms(GMOs).[xiv]

The burgeoning organic market here in the US is also being affected. Many organic farmers have lost contracts for organic seed due to high levels of contamination. This problem is increasing and is expected to get much bigger in the coming years.

[81] http://www.theecologist.org/blogs_and_comments/commentators/2632105/living_with_gmos_a_letter_from_america.html

Pesticides and superweeds

The most widely grown types of GM crops are known as 'Roundup Ready' crops. These crops, mostly corn and soy, have been genetically engineered so that when they are sprayed with the herbicide Roundup - the active ingredient of which is glyphosate - the weeds die but the crop continues to grow.

This has created a vicious circle. Weeds have become resistant to the herbicide, causing farmers to spray even more. Heavier use of herbicides creates ever more "superweeds" and even higher herbicide use.

A recent review found that between 1996 and 2011, farmers who planted Roundup Ready crops used 24% more herbicide than non-GMO farmers planting the same crops.[xv]

If we remain on this trajectory with Roundup Ready crops we can expect to see herbicide rates increase by 25% each year for the foreseeable future.

This pesticide treadmill means that in the last decade in the US at least 14 new glyphosate-resistant weed species have emerged[xvi], and over half of US farms are plagued with herbicide-resistant weeds.[xvii]

Biotech companies, which sell both the GM seeds and the herbicides,[xviii] have proposed to address this problem with the creation of new crop varieties that will be able to withstand even stronger and more toxic herbicides such as 2,4-D and dicamba.

However it is estimated that if these new varieties are approved, this could drive herbicide use up by as much as 50%.[xix]

Environmental harm

Studies have shown that the increased herbicide use on Roundup Ready crops is highly destructive to the natural environment. For example, Roundup kills milkweeds, which are the key food source for the iconic Monarch butterfly[xx] and poses a threat to other important insects such as bees.[xxi]

It is also damaging to soil, killing beneficial organisms that keep it healthy and productive[xxii] and making essential micronutrients unavailable to the plant.[xxiii]

Other types of GM plants, which have been engineered to produce their own insecticide (e.g. "Bt" cotton plants), have also been shown to harm beneficial insects including green lacewings[xxiv], the Daphnia magna waterflea [xxv] and other aquatic insects,[xxvi] and ladybugs (ladybirds).[xxvii]

Resistance to the insecticides in these plants is also growing[xxviii], creating new varieties of resistant "superbugs" and requiring more applications of insecticides at different points in the growth cycle, for instance on the seed before it is planted.[xxix] In spite of this, new Bt varieties of corn and soy have been approved here and will soon be planted.

A threat to human health

GM ingredients are everywhere in our food chain. It is estimated that 70% of processed foods consumed in the US have been produced using GM ingredients. If products from animals fed GM feed are included, the percentage is significantly higher.

Research shows that Roundup Ready crops contain many times more glyphosate, and its toxic breakdown product AMPA, than normal crops.[xxx]

Traces of glyphosate have been found in the breastmilk and urine of American mothers, as well as in their drinking water.[xxxi] The levels in breastmilk were worryingly high - around 1,600 times higher than what is allowable in European drinking water.

Passed on to babies through breastmilk, or the water used to make formula, this could represent an unacceptable risk to infant health since glyphosate is a suspected hormone disrupter.[xxxii] Recent studies suggest that this herbicide is also toxic to sperm.[xxxiii]

Likewise, traces of the Bt toxin have been found in the blood of mothers and their babies.[xxxiv]

GM foods were not subjected to human trials before being released into the food chain and the health impacts of having these substances circulating and accumulating in our bodies are not being studied by any government agency, nor by the companies that produce them.

Studies of animals fed GM foods and/or glyphosate, however, show worrying trends including damage to vital organs like the liver and kidneys, damage to gut tissues and gut flora, immune system disruption, reproductive abnormalities, and even tumors.[xxxv]

These scientific studies point to potentially serious human health problems that could not have been anticipated when our country first embraced GMOs, and yet they continue to be ignored by those who should be protecting us.

Instead our regulators rely on outdated studies and other information funded and supplied by biotech companies that, not surprisingly, dismiss all health concerns.

A denial of science

This spin of corporate science stands in stark contrast to the findings of independent scientists.

In fact, in 2013, nearly 300 independent scientists from around the world issued a public warning that there was no scientific consensus about the safety of eating genetically modified food, and that the risks, as demonstrated in independent research, gave "serious cause for concern".[xxxvi]

It's not easy for independent scientists like these to speak out. Those who do have faced obstacles in publishing their results, been systematically vilified by pro-GMO scientists, been denied research funding, and in some cases have had their jobs and careers threatened.[xxxvii]

Control of the food supply

Through our experience we have come to understand that the genetic engineering of food has never really been about public good, or feeding the hungry, or supporting our farmers. Nor is it about consumer choice. Instead it is about private, corporate control of the food system.

This control extends into areas of life that deeply affect our day-to-day well-being, including food security, science, and democracy. It undermines the development of genuinely sustainable, environmentally friendly agriculture and prevents the creation of a transparent, healthy food supply for all.

Today in the US, from seed to plate, the production, distribution, marketing, safety testing, and consumption of food is controlled by a handful of companies, many of which have commercial interests in genetic engineering technology.

They create the problems, and then sell us the so-called solutions in a closed cycle of profit generation that is unequalled in any other type of commerce.

We all need to eat, which is why every citizen should strive to understand these issues.

Time to speak out!

Americans are reaping the detrimental impacts of this risky and unproven agricultural technology. EU countries should take note: there are no benefits from GM crops great enough to offset these impacts. Officials who continue to ignore this fact are guilty of a gross dereliction of duty.

We, the undersigned, are sharing our experience and what we have learned with you so that you don't make our mistakes.

We strongly urge you to resist the approval of genetically modified crops, to refuse to plant those crops that have been approved, to reject the import and/or sale of GM-containing animal feeds and foods intended for human consumption, and to speak out against the corporate influence over politics, regulation and science.

If the UK and the rest of Europe becomes the new market for genetically modified crops and food our own efforts to label and regulate GMOs will be all the more difficult, if not impossible. If our efforts fail, your attempts to keep GMOs out of Europe will also fail.

If we work together, however, we can revitalize our global food system, ensuring healthy soil, healthy fields, healthy food and healthy people.

Recommended reading: Bt in organic farming and GM crops - the difference
http://www.gmwatch.org/latest-listing/40-2001/1058-bt-in-organic-farming-and-gm-crops-the-difference-

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