BIOLOGICAL FARMERS OF AUSTRALIA

Genetically Modified Crops Management Act Review
GPO Box 1671
ADELAIDE SA 5001
By Email to: gmcropsactreview@saugov.sa.gov.au

Monday 20th August 2007

Dear Sir or Madam,

Please find attached our submission on behalf of the BFA group to the South Australian State Government review of the Genetically Engineered canola moratorium.

We also wish to place on the public record our concerns about the process of review as adopted by the South Australian Government. These concerns affect our confidence in the Advisory Committees ability to deliver an impartial report.

1. There has been no invitation for BFA to present face to face with the advisory committee as has happened in Victoria and NSW.
2. When the Government Advisory Committee was established the BFA put forward a nomination to the Government of one of our high profile members involved in the organic grains industry and yet this was rejected. Thus there is no representative for the organic sector on the Advisory Committee.
3. As part of the review process the State Government has an obligation to address the legal uncertainties should GE canola be released in Australia causing contamination. The Advisory Committee should commission high level legal advice in order to assess the likely costs of litigation on the farm sector and factor this into the increased production costs should GE canola be released. This will directly affect the marketability of GE canola.
4.

Yours sincerely,

Scott Kinnear

BFA board member and spokesperson.

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BIOLOGICAL FARMERS OF AUSTRALIA CO-OP LTD
ABN 75 699 664 781

HEAD OFFICE - BRISBANE
PO Box 530 L1 766 Gympie Rd
CHERMSIDE QLD 4032
Ph: +61 (0)7 3350 5716
Fax: +61 (0)7 3350 5996
info@bfa.com.au

SOUTHERN DIVISION OFFICE
PO Box 503 1 Gawler St
NURIOOTPA SA 5355
Ph: +61 (0)8 8562 2769
Fax: +61 (0)8 8562 3034
info@bfa.com.au

www.bfa.com.au

BIOLOGICAL FARMERS OF AUSTRALIA

Genetic Engineering – A review of the Evidence

August 2007

Biological Farmers of Australia

Submission prepared for BFA by Alasdair Smithson, Organic Knowledge

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Fax: +61 (0)8 8562 3034
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Background to BFA

The Biological Farmers of Australia Cooperative is the leading organic representative body in Australia with more than a thousand members. Its purpose is to support the production and consumption of certified organic foods in Australia.

Through two subsidiary companies, Australian Certified Organic and Organic Growers of Australia, the BFA group certifies approximately 70% of the certified organic products on the market in Australia. These two organisations certify more than 1700 businesses ranging from primary production, through to wholesale, processing, import / export and retail.

The BFA submission is on behalf of these members and certified businesses whose livelihood is directly dependant on a vibrant organic sector.

Executive Summary

This submission is a review of the evidence to date that forms the basis for our case for extending the moratorium on the commercial planting of genetically engineered (GE) food crops in Australia until 2013. The evidence has been sourced from a wide range of credible sources and a list of references can be found at the rear of the document.

The Biological Farmers of Australia completely rejects the lifting of moratoriums in 2008 by State Government's that currently prohibit the commercial production of GE canola. We are equally opposed to any supply chain trials or further field trials which have already put Australia's GE free canola status at risk.

There is a considerable body of evidence to suggest that the long term production and consumption of GE foods will cause significant harm to human health and the environment. We have included an assessment of these risks because they are intricately linked to the marketability of GE crops. A major risk to the GE industry is that a GE food product will be found to cause harm triggering a world wide rejection of GE foods. The risk of this alone is sufficient reason not to lift the moratoria.

Additionally our review of the evidence clearly shows that the introduction of GE canola would cause considerable economic harm to Australia's organic sector and to our grains industry in general. The cost of supply chain management, segregation, control of multiple herbicide resistant weeds and litigation are just a few of the impacts that would reduce on farm income should GE canola be introduced. We would also lose the healthy premium for our Non GE canola over Canadian GE canola which has been achieved during the last two years.

The Nth American experience with GE canola has shown that destruction of organic and GE free product will occur. The costs for the release of GE canola will be borne by the organic and GE free grains sector raising real issues of liability under common law. In Nth America this has lead to billions of dollars of law suits. The release of GE canola will violate the principle that new industries must not pollute and impact on the economic livelihoods of others.

The State Governments by lifting the moratoria would be favoring global corporations over farmers' livelihoods and our inalienable right to grow and consume GE free foods. These corporations will be the real beneficiaries.

Notably the proponents of GE have brought nothing new to the table over the last four years. Instead we hear emotive arguments claiming drought and salt tolerance and crops that use less fertilizer. None of the GE canola crops under consideration offer these futuristic properties that can readily (and with out the risk) be produced using non GE marker assisted breeding.

Additionally the GE proponents continue to wrongly claim that we will fall behind our Nth American competitors. Yet Canadian farm incomes have

plummeted since 1996 when GE canola was introduced. In Canada and Nth America many billions of dollars of direct farm subsidies on an annual basis are needed to prop up an unprofitable GE production system.

The Organic Market

Fuelled by strong consumer demand, international markets have demonstrated a structural shift to sustained significant growth in organic sectors. Exceptionally high market growth rates are pushing global organic food & drink sales towards US $40 billion this year. With demand outpacing supply, a number of regions are experiencing supply shortages.

i. World organic market grew by an est. 7-10% in 2004, totalling US $37.2 Billion[1]
ii. Sectors of the organic market growing between 10 - 25%pa [2]
iii. US market 2.3% of total grocery market share [3]

In recent years Australia has very much mirrored the growth rates of the international market with a 15 – 20%[4] per annum increase in organic retail sales, making it the fastest growing industry in the food and drinks sector.

iv. Australian Organic Market 2006: AUD 400 Million [5]
v. Certified Organic Area (Australia) 2006: 12.3 Million Ha [6]
vi. Certified Organic Operators (Australia) in 2006: 2567[7]

Europe is the key export market for Australian organic products (in particular, Germany, The Netherlands, United Kingdom), accounting for over 70 percent of Australian organic exports (Austrade, 2003). More recently, Asia with its heavily populated countries, such as Japan, Singapore, Hong Kong and the US are also emerging as strong importers of Australian organic produce.

The primary products for export are grains, processed products, seeds and horticultural products. Fruit juice, wine and soymilk are the dominant export articles in the organic beverage category (Austrade, 2003). Assumed key drivers behind export market growth are mounting concerns about the process quality of food e.g. use of genetically modified organisms (GMOs), the application of chemicals in food production, etc.), and concerns for general health and wellbeing (McCoy & Parlevliet 2000, von Alvensleben 2001).

[1] Organic Food and Farming Report, Soil Association (2005)
[2] International Federation of Organic Agriculture Movement, www.ifoam.org (2004)
[3] US Department of Agriculture, www.usda.gov (2005)
[4] International Federation of Organic Agriculture Movement, www.ifoam.org (2004)
[5] BFA Annual Report, www.bfa.com.au (2006)
[6] BFA Annual Report, www.bfa.com.au (2006)
[7] BFA Annual Report, www.bfa.com.au (2006)

GE and Organic Overseas

Australia is a net exporter of agricultural produce and primarily exports both GE free and Organic produce to the EU, US and Asia. Under the regulations for organic certification GE technology is not allowed.

The AQIS National Organic Standard 2005 section 3.2.6 states that: *GMO products are not compatible with organic and bio-dynamic management practices and are not permitted under a parallel production system.*

The following section gives an overview of the market opportunities and threats regarding organic and GE products in the EU, US and Asia.

EU Market – GE v Organic

Due to strong consumer demand several European countries are experiencing supply shortages this year as consumer demand for organic foods has escalated. The organic meat & dairy sectors are the most adversely affected with imports coming in from Australia and Latin America (Willer & Yussefi, 2004).

This highlights a very real export opportunity for Australian organic farmers, which could be jeopardized if contamination from GE crops occurs. There is already an equivalence agreement in place between the EU Organic Regulations 2092/91 and 1804/99, which legally defines organic farming in Europe and the AQIS National Organic Standard, which legally defines the export of organic produce from Australia.

This means that organic farmers in the EU and Australia can trade organic produce with relative ease. However if the commercial planting of GE crop(s) were to go ahead in Australia then it is likely that this equivalence agreement would have to be reviewed due to the potential risk of GE contamination.

The EU has tight restrictions on GE imports. In fact, the trade of GE commodities into the EU was lost because of the overwhelming market rejection of GE. Since 1999 European supermarkets and food manufacturers have rejected GE in response to the strong consumer opposition to GE. European regulations require any food or feed products, which are known to contain any amount of GE to be labeled 'GE'. This is at the expense of the manufacturer/producer of the commodity (Soil Association 2007).

The EU Organic Standards state the following:

‘Genetically modified organisms and/or any product derived from such organisms must not be used, with the exception of veterinary medicinal products’.

‘Feeding stuffs, feed materials, compound feeding stuffs feed additives, processing aids for feeding stuffs and certain products used in animal nutrition

must not have been produced with the use of genetically modified organisms or products derived there from'.

If the commercial planting of GE crops were to go ahead in Australia then the likely outcome is that all organic produce exported from Australia to the EU would have to be tested to ensure it came under the EU threshold of GE contamination. This would likely be at the expense of the farmer or processor. For a standard Polymerase Chain Reaction (PCR) test this is, $300 - $350 per sample and does include does not include the storage and handling costs for segregating GE and non-GE supply streams, which are more complex and probably an even more significant cost.

Asian Market – GE v Organic

Japan is the most important organic export market in the Asian region due to its strong economy and large population. Sales of organic food and drink were estimated at about USD 350 million in 2002. Organic Monitor reported recently that there has been a notable increase in the consumption of organic products over the last few years, in some areas as much as 30 – 40%. All the Asian countries, including Japan are highly dependent on imports with Japans retail sales making up to 60% of Asia's organic trade.

The Japanese Agricultural Standards (JAS) only allows organic foods that are certified by an accredited organization to be marketed as organic foods. Australia Certified Organic (ACO) is currently the only organic certification body that is accredited by JAS to certify Australian organic farmers for export to Japan, although there are 2 other certification bodies in Australia that are currently applying for JAS accreditation.

The JAS state that organic food is to be produced '*without using recombinant DNA technology (meaning technology preparing the recombinant DNA by connecting DNA through the breakage and reunion using enzyme, transferring it into live cells, and proliferating it; being the same hereafter.)*

Other important Asian markets for organic products are in China, South Korea, Singapore, Hong Kong, and Taiwan. Countries like Malaysia, Thailand, and India are also expected to show growing opportunities for organic exports (Willer & Yussefi, 2004).

In Japan there is currently no legislation for GE commodities such as canola to be labeled as GE. However a poll, by the Japanese Ministry of Agriculture, Fishery and Forestry (MAFF), found that 78% of Japanese consumers were uncertain about the impacts of eating GE foods.

As a result of recent contamination issues Japan is currently facing a serious environmental threat caused by GE canola, which is growing wild. On July 7, 2007, NO! GMO Campaign published the findings of a citizen's survey, which found that spilled GE canola found growing in Japan. The survey was carried out from March 2007 onwards by citizens in 43 out of the total of 47

prefectures in Japan.

In total, 1617 samples were tested and of these 37 showed up as GE positive. A similar survey was also conducted in South Korea and is due to the spillage of imported Canadian canola seed in and around the ports of Kashima port, Chiba port, Yokkaichi port, Nagoya port, Kobe port, Shimizu port, Hakata port and Yokohama port.

This happens while unloading, and during transportation, as well as around cooking oil, manufacturing factories, and the wild GE canola is now growing rapidly in a wide range of different environments. There are serious concerns that the growing of GE canola will spread further and intercross with Japanese rapeseed plants, and moreover to contaminate related plants, such as cabbage, Chinese cabbage, daikon radish and turnip.

Another finding, according to surveys conducted by a team lead by Professor Masaharu Kawata (Yokkaichi University) in Mie prefecture between 2005 and 2007, is that GE canola is becoming perennial. It is not common for canola to be biennial due to the cold Canadian winters, but in the warmer winters in Japan, canola can survive for several years and became like a bushy tree, and pollen from GE canola then continues to spread year after year. Thus, the environmental impact caused by spilled GE canola seeds is potentially very serious in Japan.

According to Professor Kawata, "There is leaf mustard and conventional canola growing around the spilled GE canola plants, so it is only a matter of time before they are crossed and contaminated by GMOs. Also, some other cruciferous vegetables like Japanese radish and Chinese cabbage are in danger of GE contamination."

Japan does not produce any GE crops. However, because Japan imports GE canola from Canada, GE contamination has already occurred and it is spreading to a much greater degree than one could imagine. If GE crops are cultivated, then this kind of pollution will spread even more as has already been the case in Canada. Segregation between GE and non-GE becomes almost impossible, and keeping pure non-GE varieties away from GE contamination is very hard (see segregation section pg14).

The clear conclusion from the findings is that cultivating or importing GE crops, leads to GE pollution and once this pollution begins, it can cause irreversible damage. Japan imports approximately 2 million metric tons of canola seed each year, with 80% of total imports coming from Canada. If the occurrence of contamination continues and consumers continue to reject it’s use then there is a strong chance that the importation of GE canola by Japan could cease. Opening up a big market for non-GE canola for exporters such as Australia.

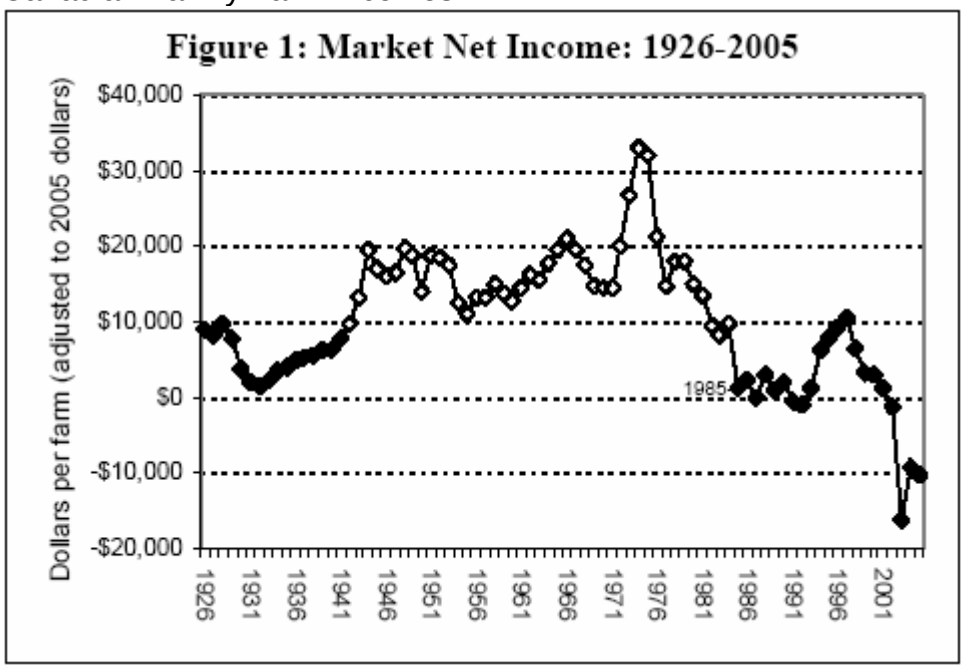
North America & Canada – GE v Organic

The US Market is undersupplied with organic produce, primarily organic meat and dairy products. This is most evident in the North American region where there is a strong demand for Australian organic produce (Willer & Yussefi, 2004). The United States Department of Agriculture (USDA) organic standards also prohibit GE contamination in organic produce.

GE food has largely been pushed unlabelled and largely unknowingly onto American and Canadian citizens and is now very established in their food chain. Due to loss of organic markets such as the EU for GE grown maize, soya and canola there is no real export opportunity for GE commodities into the US and Canada. The North American Widespread contamination of non-GE crops and the lack of any significant market for GE foods in Europe resulted in the US losing its USD $300 million annual export market of maize and Canada losing its USD $300 million export market of canola (Soil Association, 2007).

In total GE crops may have cost the US economy at least USD $12billion net from 1999 - 2001 alone. The severe market problems have led many North American farmers to seriously question the further development of GE crops. The US and Canadian National Farmers Unions, American Corn Growers Association, Canadian Wheat Board, organic farming groups and more than 200 other groups are lobbying for a ban or moratorium on the introduction of the next major proposed GE food crop, GE wheat.

Canadian Family Farm Incomes.



This graph from the National Farmers Union report from 30th November 2005 titled “The farm crisis & Corporate Profits” shows the drop into negative territory for family farm incomes post 1996 when GE canola was introduced. 2004 was described as the worst year on record while corporate agribusiness

profits were the highest on record. Agribusiness corporations are defined as those providing the inputs such as oil, seeds & chemicals, supply chain handlers and food processors. Canadian taxpayer subsidies are quoted to be in the vicinity of four to five billion dollars per annum reducing the capacity of government to spend on health and education.

Export Markets for Canola

Japan is the main export market for Canola, with the EU demand for Canola seed growing due largely to the growth of the bio-diesel sector. Due to the EU stringent regulations on GE, Canadian canola has not been allowed in since 1997. If not for the GE restrictions the Canadian Canola Council estimate that between 0.3 and 0.4 Mt of Canadian canola could have been exported to the EU in 2005-06.

The Canola Council of Canada estimated that Japan accounted for 40.9% of imports in 2006. About 80% of Japans imported Canola came from Canada and it is estimated that about 80% of this was GE canola. Due to ongoing concerns in Japan over the wild contamination from GE canola, one of the largest importers of Australian non-GE canola, Hirata Sangyo, has due to concerns over Australian state moratoriums being lifted in 2008 changed his buyer from the Australian mainland to Kangaroo Island.

Of the world's GE canola 97% is grown in Canada. It was introduced in 1996 and now accounts for about 79% of Canadian canola. By 1998 Canada had entirely lost its US $300-400 million annual sales of canola seed to Europe. USDA figures indicate that high levels of carry-in stock (stock not sold immediately) is afflicting Canadian GE canola producers, indicating an inability to immediately sell their GE canola into the world's markets. While Department of Agriculture figures for Australian carry-in stock of canola are not available, there is no evidence that Australia is having similar problems.

The EU, China and Japan have all instituted strict rules regarding the import and labelling of GE products, reflecting the strong and continuing resistance to GE in these countries. Japan, China and the EU are major export markets for Australian canola seed, accounting for 65% of exports between 2001 and 2004. The combined value of these markets over this period was $829 million.

Japan, in particular, is an extremely important market - receiving 50% of Australian canola seed exports between 2001 and 2004. Consumer resistance to GE is extremely strong in Japan, and the recent scandal regarding GE canola contamination around Japanese ports has further heightened fears. If GE canola is commercialised in Australia the negative consequences for Australian grain markets could be significant.

The WA inquiry into the Gene Technology Bills observed that "Australia was able to secure greater market access because it was producing non-GE canola" According to Perry Gunner from ABB Grain, Japan's interest in buying Australian canola is growing. He states that there are further opportunities to sell canola there because of Australia's GE free status.

The domestic market accounts for approximately 20-30% of total canola seed production (depending on the year), making it the second or third largest market for Australian canola. The two largest buyers are Goodman Fielder and Unilever, both of which have policies to avoid the use of GE derived canola oil. The Western Australia Standing Committee on Environment and Public Affairs Committee is of the view that *"that the non-GE market should not be sacrificed at the expense of the GE market."*

Economic gain

Due to Australia's moratorium on the commercial planting of GE canola compared to Canada there have been very positive economic impacts for the canola sector. There is also the bequest/socio-economic value that is associated with Australia's clean green GE free image, which is hard to put a monetary figure on. The area of planted GE canola globally stalled in 1999 and has not significantly increased in size over the past 8 years, clearly indicating that there is a lack of demand for GE canola (ISAAA, 2007).

Of the only three countries selling canola into the world markets in 2006 (Canada 70%; USA 11%; Australia 19%) Australia was the only GE-free exporter of canola, it should also be noted that both American and Canadian farmers are subsidized, whereas Australian farmers are not. US farm subsidies were meant to have fallen over the last few years. Instead they have risen dramatically, paralleling the growth in the area of GE crops. The lost export trade as a result of GE crops is thought to have caused a fall in farm prices and hence a need for increased government subsidies, estimated at an extra US $3–$5billion annually (SOD, 2002).

Due to Australia's situation as a GE free exporter, during the last two years and with this competitive advantage came premiums of up to US $120/t (ABARE 2007 – Appendix 1). Back in 1998 before GE canola was sold the price was US $70 a tonne in favour of Canadian farmers. The average of 136 months up to and including May 05 showed that Canada enjoyed a premium of $21 US per tonne. The 24 months up to and including May 07 show that Australia has enjoyed an average premium of $47 US per tonne. The difference is $68 US per tonne in Australia's favour. It is worth noting that the labelling of animal feeds and oils came in during 2004. This has driven the biofuels market to prefer Australian GE free canola in preference to Canadian because the crushed meal can then be used as animal feed in the EU without issue.

The lack of commercially grown GE crops in Australia gives consumers (see consumer section pg17) confidence in the quality of the Australian food supply. With Australia being surrounded by water there is a real opportunity to market and advertise Australian grown commodities as genuine GE-free, which due to strong overseas consumer demand, would give a competitive advantage over other countries and be an extra boost for the economy. One such example of this is the growth of organic foods (see organic market section pg5), which is the fastest growing food and drink sector in the world.

Economic loss

For North America the economic impact of GE crops has been an economic disaster. As well as the lower farm profitability, GE crops have been a market failure internationally. Because of the lack of segregation, they have caused the collapse of entire exports to Europe and a loss of trade with Asia. The US share of the world soya market has also decreased.

If the moratorium were to be lifted on the growing of GE crops, Australia would have the higher costs of: Testing, identity preservation (labeling), segregation, handling, rejected shipments, some lost markets and lower confidence in Australia's clean, green, GE-free reputation for all foods.

As has already occurred in Japan and Canada (see contamination section pg14) the cost of cleaning up herbicide tolerant volunteers and weeds such as wild radish and charlock would have to be met. These costs would be met from a large section of the Australian citizens e.g. local councils, landcare groups, farmers, gardeners, etc. It could also have the very detrimental effect of certified organic farmers and non-GE farmers potentially losing their markets due to contamination. Such as has already happened in Saskatchewan, Canada (see contamination section pg14)

In the advent of the moratorium being lifted and to ensure that organic farmers/processors and non-GE farmers have adequate protection and compensation measures in place there would be the cost of putting in place a legal co-existence system (see segregation & legal section pg14)

Economic cost to the farmer

Currently, non-GE farmers are expected to bear many, if not most, of the costs of introducing GE crops. The Australian Bureau of Resource Economics (ABARE) has estimated that the introduction of GE canola will cost non-GE farmers 5-15% of the farmgate value of their crop. That figure is based on a 0.9% contamination acceptance threshold – a threshold not currently accepted by farmers or export markets and doesn't include financial risk, including potential liability and lost market access, when the inevitable contamination occurs.

If a ‘zero tolerance’ segregation system is implemented, costs are likely to be significantly higher. Additionally, non-GE farmers will be exposed to increased financial risk, including potential liability and lost market access, when the contamination occurs. Contamination costs must be considered an inevitable cost of doing business if Australia embraces GE food crops.

In a recent report, Nuffield scholar Andrew Broad estimated that GE Roundup Ready canola would cost $27.82 per hectare more to grow than conventional canola. He claimed that this would be compensated for if there was a yield gain of 4%, not taking into account the additional costs of segregation and

identity preservation. However, a review by the Australian Productivity Commission concluded that Canadian GE canola varieties have only shown a 1% increase in yield. This increase is also likely to be quickly eroded by problems of herbicide resistance.

A study by University of Saskatchewan researchers published in 1999 revealed that the yields of Roundup Ready (RR) canola fell around 7.5per cent short of conventional canola. The RR rape managed 33bushel/acre while the conventional achieved 35.7bushel/acre. The main reason farmers say they chose to go in to GE crops was for increased yields, on average the claims of increased yield have not been realized for most GE crops with RR canola yields less than non-GE canola.

There is a final problem with the yields from GE crops. GE varieties increase farmer seed costs by 25per cent to 40per cent an acre, so yields have to be higher and/or other costs lower for farmers to break even. Thus, even where the data shows that yields have increased for some farmers, the increase may not be sufficient to avoid the farmers being worse off financially.

A survey of crop management practices of 650 canola growers in Canada of the 1997 - 2000 crop, carried out by the Canadian canola industry, found Herbicide Tolerant (HT) canola had been treated on average about 20per cent more often than non-GE crops, with 2.1 herbicide applications to Roundup Ready and Liberty Link crops compared to 1.8 for non-GE crops (SOD, 2002).

Environmental cost

Both Glyphosate and Glufosinate are broad-spectrum herbicides that are toxic to most plants including farmed crop plants, so they cannot normally be applied to a field once the crop has grown. GE herbicide tolerant technology means that farmers can now use these chemicals during the crops growing period.

Farmers are generally keen to eliminate as many weeds as possible and often aim for completely ‘clean’ fields, even if complete weed control is not necessary or advisable in overall economic terms. HT crops enable farmers to achieve their aim of eradicating all weeds. For example, easier and better weed control was the top reason given by western Canadian growers for choosing HT rape.

While HT crops are therefore a very easy and attractive option for farmers, they set agriculture back on a more chemical dependent path. The claim that GE crops would result in lower agrochemical use was based on the flexibility of being able to use the herbicide at any time. This meant that it could then be applied at the most effective time for weed control, and thus require only one application.

However, farmers have found that, for a single application to be sufficient for

weed control purposes, it needs to be applied at a late stage in crop development, by which time the weeds have been present most of the time and caused a yield loss and competed for available water and nutrients. In practice, most farmers are therefore applying herbicides several times throughout the life cycle of the HT crop.

This could be anything up to six applications of Glyphosate in total. Many farmers are also still using other herbicides as well as Glyphosate and Glufosinate, such as applying persistent herbicides before the crop emerges that will have a continuous effect. This intense use of Glyphosate is leading to new weed control problems, which are gradually offsetting the convenience of HT crops. Different weed species are not equally susceptible and shifts are occurring in the composition of the weeds in the fields, towards species that are less affected by the herbicide.

In most states with a substantial RR soya acreage, there is also now evidence of weed species developing resistance to Glyphosate. These weeds are requiring much heavier applications of herbicides. The experience in Iowa, US shows that shifts in weed populations can happen very rapidly. For example, common Waterhemp (Amaranthus Rudis) populations delayed germination and escaped the Glyphosate applications. Velvetleaf (Abutilon Theophrasti) demonstrated a greater tolerance to Glyphosate and farmers reported problems controlling this weed with the rates of Glyphosate for which they were willing to pay.

In Missouri, US where over half the soya crop is GE, farm advisers report that Waterhemp has become an increasing problem in recent years. In March 2002, farm advisers at the University of Mississippi reported the appearance of resistant horseweed that was requiring a six to thirteen-fold increase in the amount of Glyphosate to achieve the same levels of control as normal horseweed.

There is also the widespread arrival of herbicide resistant canola volunteer plants in Canada, a serious problem for weed control, which is leading to a much greater use of herbicides HT volunteers and the change in weed populations and resistance, means that in many cases farmers also appear to be reverting to older and more toxic herbicides as a result of HT crops.

Bill Freese of the Center for Food Safety has cited recent USDA data and past work by the Organic Center's Chief Scientist Dr. Charles Benbrook, to dismantle the myth that GE crops have reduced herbicide use. One major reason – the emergence of several Glyphosate resistant weeds that are spreading fast across major production regions.

To combat resistant weeds in US soybean fields in 2006, compared to 2005 herbicide treatments, farmers had to apply:

- 42 percent more glyphosate (linked to non Hodgkins lymphoma, reproductive problems and frog declines); and,

- 129 percent more 2,4-D (known to trigger reproductive problems and birth defects in agricultural communities).

The claims that HT crops would reduce agrochemical use and be better for the environment overlooks the fact that many farmers have already begun adopting modern weed control practices which involve a greatly reduced use of herbicides. For example, integrated crop management (ICM) uses specific management practices to reduce weed problems. Organic farmers have taken this approach further and are not permitted to use any herbicides at all (SOD, 2002)

The increased use of herbicides and pesticides in GE farming is also bad for the long-term outlook of the environment. It has been widely accepted by scientists and Governments worldwide that climate change is upon us and that there are severe ramifications if we do not do something to combat it. Agriculture is already responsible for 30% of greenhouse gas emissions, mainly through the amount of energy needed through the burning of fossil fuels to produce synthetic agrochemicals such as herbicides. Does Australia, which has the highest emissions of CO^2 per capita in the world already, want to adopt a technology that requires a greater energy unit than a non-GE crop?

Co-existence and contamination

GE genes have been spread up to 4.5km (FoE, 1999) through pollen and seed carried by wind. birds, bees, insects, fungi, bacteria, rain, machinery and transportation. Once the pollen and seed from GE plants are out in the environment there is no effective way of containing them – they can't simply be recalled and genetic pollution is a very real issue.

Contamination has caused the loss of nearly the whole organic canola sector in the province of Saskatchewan, at a potential cost of millions of dollars. Organic farmers are struggling practically and economically and many have been unable to sell their produce as organic due to contamination. All non-GE farmers are finding it very hard or impossible to grow GE-free crops. Seeds have become almost completely contaminated with GEOs, good non-GE varieties have become hard to buy, and there is a high risk of crop contamination (SOD, 2002). *"The cultivation of GE-free crops of maize, canola and soya, is for practical purposes no longer possible anywhere in Canada"* (Fleming, 2003)

Recent published research in Spain confirms that 'coexistence' between GE and organic farming in Europe does not work. Spain is the only EU country where in one region a significant area is being planted with one GE crop, GE maize. The result has not been the happy coexistence that the Spanish farmers were promised was possible. Instead, many organic farmers in Catalonia and Aragon in Northern Spain are being forced to stop growing maize.

Two Spanish farming organizations and Greenpeace Spain analyzed nearly

40 farms with conventional non-GE and organic maize fields in Catalonia and Aragon in 2005. Seven cases of contamination were found, in one case involving two different GE maize varieties, with one organic crop contaminated with 12.6% GE. The local Aragonese Organic Agriculture Committee carried out its own analysis of eight samples of organic maize and found 50% were contaminated with GE maize (Soil Association, 2006).

The US Department of Agriculture announced that unapproved GM rice, Liberty Link 601, was found contaminating commercial long-grain rice supplies. According to Riceland Foods, a farmer-owned rice cooperative, the GM rice was first discovered in conventional rice supplies by one of its export customers. The discovery of the unapproved genetically engineered rice in the food supply depressed rice prices, damaged US rice export markets, spurred farmer lawsuits against the rice's developer, Bayer CropScience, and raised new questions about the US's ability to control GE crops. Bayer confirmed the findings but it is not known how the contamination occurred.

LL601 is a long-grain rice variety that is genetically engineered to tolerate sprays of Liberty herbicide. The GM rice never received USDA approval though two similar herbicide-resistant varieties have been approved. LL601 was grown in field tests between 1998 and 2001. In Europe, the European Commission adopted emergency measures requiring that all long-grain rice imports from the US be tested by an accredited laboratory using a validated test method and be certified as free of LL601. "There is no flexibility for unauthorized GMs - these cannot enter the EU food and feed chain under any circumstances," said Markos Kyprianou, European commissioner for health and consumer protection in an interview with FoodNavigator.com

Segregation & legal costs

A Western Australian Parliamentary inquiry into genetic modification formed the view that "contamination of non-GE crops by GE crops is inevitable, segregation is not practical and that identity preservation can be achieved, but at a significant cost.

Segregation would be extremely difficult, perhaps impossible, and extremely costly. The WA inquiry found that "extra costs will arise with an identity preservation system due to the additional work involved throughout the supply chain, including in growing, handling, storage, transport, processing, cleaning and administration. Certification and/or testing of the GE status of bulk commodities in the marketing chain and labelling will also contribute to the additional costs."

The GE industry has argued that genetic contamination at levels of up to 0.9% is an appropriate standard for Australia. While the 0.9% figure reflects labelling requirements in Australia and Europe, it does not reflect market realities or requirements. The Australian Bureau of Agricultural and Resource Economics (ABARE) has noted that, "zero tolerance in an importing country for contamination with GE canola would make it very difficult, if not impossible, for a country producing a mix of GE and non-GE canola to address that market."

Even maintaining a 0.9% threshold, is likely to be extremely difficult. A recent study from the UK demonstrated that a single GE canola crop contaminated subsequent grain crops in the same field above 1% for up to 16 years unless the most stringent of measures were implemented.

Because of the lack of segregation, the whole food processing and distribution system has become vulnerable to costly and disruptive contamination incidents. In September 2000, just 1% of unapproved GE maize contaminated almost half the US national maize supply and cost the company, Aventis, up to $1billion (SOD, 2002).

Through the introduction of GE crops has come the accusations of farmers infringing company patent rights. A non-GE farmer whose crop was contaminated by GE was sued by Monsanto for US $400,000. While biotechnology companies are suing farmers, farmers themselves are turning to the courts for compensation from the companies for lost income and markets as a result of contamination. In Canada, a class action was launched on behalf of the whole organic sector in Saskatchewan for the loss of the organic canola market. (SOD, 2002)

In May 2003, the Center for Food Safety (CFS) embarked on a project to determine the extent to which American farmers have been impacted by litigation arising from the use of patented genetically engineered crops. After extensive research and numerous interviews with farmers and lawyers, CFS found that Monsanto, the world's leading agricultural biotechnology company, has used heavy-handed investigations and ruthless prosecutions that have fundamentally altered the way many American farmers farm. The result has been nothing less than an assault on the foundations of farming practices and traditions that have endured for centuries in this country and millennia around the world, including one of the oldest, the right to save and replant crop seed.

Monsanto's position as a leader in the field of agricultural biotechnology and its success in contractually binding farmers to its genetically engineered seeds result from its concerted effort to control patents on genetic engineering technology, seed germplasm, and a farmer's use of its engineered seed. Monsanto begins the process of seizing control of farmers' practices by getting them to sign the company's technology agreement upon purchasing patented seeds. This agreement allows Monsanto to conduct property investigations, exposes the farmer to huge financial liability, binds the farmer to Monsanto's oversight for multiple years, and includes a variety of other conditions that have effectively defined what rights a farmer does and does not have in planting, harvesting, and selling genetically engineered seed.

Monsanto itself admits to aggressively investigating farmers it suspects of transgressions, and evidence suggests the numbers reach into the thousands. According to farmers interviewed by CFS, these thousands of investigations frequently lead to the second stage. Monsanto pressuring the farmer to settle out of court for an undisclosed sum and other terms agreed to in confidential settlements. For some farmers, Monsanto's investigation of

them will lead to the courtroom. Up until 2003, Monsanto had already filed 90 lawsuits against American farmers. The lawsuits involve 147 farmers and 39 small businesses or farm companies, and have been directed at farmers residing in half of the states in the U.S. The odds are clearly stacked against the farmer.

Monsanto has an annual budget of US $10 million dollars and a staff of 75 devoted solely to investigating and prosecuting farmers. The largest recorded judgment made thus far in favor of Monsanto as a result of a farmer lawsuit is US $3,052,800.00. Total recorded judgments granted to Monsanto for lawsuits amount to US $15,253,602.82.

Farmers have paid a mean of US $412,259.54 for cases with recorded judgments. Startling though these numbers are, they do not begin to tell the whole story. Many farmers have to pay additional court and attorney fees and are sometimes even forced to pay the costs Monsanto incurs while investigating them. Final monetary awards are not available for a majority of the 90 lawsuits CFS researched due to the confidential nature of many of the settlements.

No farmer is safe from the long reach of Monsanto. Farmers have been sued after their field was contaminated by pollen or seed from someone else's genetically engineered crop; when genetically engineered seed from a previous year's crop has sprouted, or "volunteered," in fields planted with non-genetically engineered varieties the following year; and when they never signed Monsanto's technology agreement but still planted the patented crop seed. In all of these cases, because of the way patent law has been applied, farmers are technically liable. It does not appear to matter if the use was unwitting or a contract was never signed.

Since the introduction of GE crops, farming for thousands of America's farmers has been fundamentally altered; they have been forced into dangerous and uncharted territory and have found they are the worse for it. As growing numbers of farmers become subject to harassment, investigation, and prosecution by Monsanto over supposed infringement of its seed patents and technology agreements, there will have to be increased pressure to reverse the governmental policies that are allowing this persecution. Do we want a similar situation in Australia?

Consumer resistance

Polling by Swinburne University and Biotechnology Australia last year shows that the majority of Australians are uncomfortable with eating GE food and are unlikely to eat it. Similar attitudes exist in our key export markets, such as Europe and Japan. A survey by the Pew Global Attitudes Project shows that Western Europeans and Japanese consumers are overwhelmingly opposed to scientifically altered fruits and vegetables because of health and environmental concerns. A 2006 poll, by the Japanese Ministry of Agriculture, Fishery and Forestry (MAFF), found that 78% of Japanese consumers were uncertain about the impacts of eating GE food.

Several pro-GE commentators have dismissed the value of being GE free because GE free crops, they claim, do not attract premiums. However, the recent export figures from Canada indicate that there are premiums for GE free soy. A briefing paper prepared for the New South Wales Parliament points out that premiums have been paid for Australian GE free canola (see economic gain section pg8). Consumer resistance, however, is the strongest economic argument for remaining GE free. As the Australian Wheat Board has noted, “Legislation might allow GEs but that doesn't mean our customers want them.”

A Western Australian inquiry noted “the unpredictable nature of world commodity markets” and acknowledged “the shortcomings of any attempt to predict future market conditions and consumer behaviour” It also concluded that “there exists no certainty in the market acceptability of GE foods, with consumer attitudes being both varied and unstable on the issue.”

An ABARE research report concluded that “a range of market access restrictions related to GE products means that it is easier to trade non-GE grains in the current market environment than it is to trade GE grains.”
A UK June 2007 Dairy GE Policy Review documented a study of consumer attitudes toward GE. It said: “75% of respondents would reduce or never purchase products with traces of GE and no perceived benefits.” In the absence of benefit, the report said, consumers will avoid GE products. Even the small sample of those surveyed who *will* consider GE products said they would purchase GE milk only if it offered a discount of 30%-60%.

The researchers concluded: “It is likely that to commercialize GE foods they will need to be heavily discounted, at least in the early stages of market development.” In other words, a minority of people will only buy GE produce if farmers accept lower prices for it.

In 2001 the Eurobarometer study concluded that (16,029 people, roughly 1,000 people for each member state of the EU), 70% of Europeans did not want GE foods. The UK’s Journal of Agrobiotechnology Management and Economics (Vol 6 No 3 article 6) reported that of 2,568 consumers surveyed, only 2% said they’d eat GE breakfast cereals.

When asked: “Which would you choose when the prices are identical between GE and non-GE foods?” 71% said they would choose conventional, with the remainder undecided or having no preference.

In polls taken by AC Neilson, Roy Morgan, Millward Brown, The Age, The Sydney Morning Herald and Choice magazine a majority of Australians did not want to eat GE foods. No public poll taken to date has shown a mainstream market acceptance of biotech food in Australia or overseas. The Biotechnology Australia 2006 study found that “The Australian public see great risks from GE foods and crops and concerns are continuing to rise.”

In an August 2003 Biotechnology Australia poll 74% of farmers surveyed were

not considering using GE crops and on Sunday, April 4 2004, the ABC reported there was ‘no market’ for GE canola in Australia. Processors will not buy GE canola because “customers are not interested in buying GE product”.

More studies are coming to light that question the science behind GE and draw attention to the negative environmental and health effects of GE crops. This is likely to result in increased opposition to GE crops and an increased risk of lost markets if GE crops are adopted.

Animal & Human Health Concerns

Genetically Engineered Organisms (GEOs) are not understood well enough to be safely introduced into the food chain and are not tightly regulated enough. Many Governments only require the GE companies themselves to provide an assessment of the possible impacts of their GE crop on humans and the environment and not independent scientists.

A new regulatory concept has been created to enable the approval of GE products. This is known as the concept of ‘substantial equivalence’. It means that GE is assumed to be largely the same as the non-genetically engineered equivalent. As a result GE products do not have to go through a safety testing procedure.

This approach was opposed by many of the scientific advisers to the American government, who said that unpredictable effects of genetic engineering would not be identified by these procedures, as they were far too limited. Despite these warnings the concept of 'substantial equivalence' was adopted as the basis for the safety testing of GE crops (SOD, 2002).

Is GE food safe?

Scientists are still a very long way from truly understanding the DNA and genes of living things. As a result it is impossible to tell what the long-term health implications of GE food will be.

Genetic engineering can introduce proteins that humans have never been exposed to before. In addition, the modification process could have caused an increase in the level of existing allergens (a substance that can cause an allergic reaction). For example, one GE soya had 27% more allergens than non-GE soya. Many scientists, including several in the American Government’s Food and Drugs Administration have forecast allergic reactions.

A trial on humans of GE food was carried out by the University of Newcastle in 2002. It was commissioned by the UK Government’s Food Standards Agency. Seven people were given a meal containing GE soya and it was found that in at least three people the GE material moved out of the food and

entered their gut bacteria after only one meal. Our gut bacteria perform an important role in digestion and any changes to their characteristics are a cause of concern.

The accidental contamination of many US food products with GE Star-Link maize in 2000 is believed to have caused allergic reactions in over 50 Americans, some serious. After a full investigation, the independent advisory committee on the Star-Link case advised the US Government that there was a "medium probability" that the maize could cause allergic reactions.

The following developments indicate unidentified negative effects could be occurring:

- In the UK a 50% rise in soya allergies is reported since imports of GE soya started (York Nutritional Laboratory, reported in the Daily Express, 12.3.99)

- In Ireland doctors reported a rise in soya allergies in children since the start of GE soya imports. (Dr Elizabeth Cullen, co-chair of the Irish Doctors', The Irish Times 13.3.2001)

- In the US coinciding with the introduction of GE ingredients, food derived illnesses are believed to have doubled over the last seven years. (New York Times, 18.3.2001)

Although some GE crops have been approved overseas and marketed for several years, there was no body of scientific research on their impact on the biology of living organisms. This is partly because animal feeding trials are not required in the current safety approval process for GE in the EU or USA. Only now is a body of evidence starting to emerge from a small number of animal feeding trials into the health effects and progress in the new science of epigenetics. This indicates that genetic engineering is much more unpredictable and risky than traditional breeding.

Animal testing

An Australian study of GE peas revealed immunological effects of genetic engineering with the transfer of a 'safe' gene to a different plant species producing allergic reactions in mice. A trial by Monsanto also indicated immunological effects with higher white blood cell levels in GE maize fed rats.

The only long-term feeding trial (24 months, by an Italian team) found GE can affect key body organs, changing the cell structure and cell functioning of the liver, pancreas and testes of mice fed Roundup Ready Soya. Similarly, a Monsanto trial found rats fed its GE maize Mon863 developed smaller kidneys.

A Monsanto trial found GE consumption affects the development of the blood with fewer immature red blood cells and changes in blood chemistry in rats

fed its GE maize Mon863.

A Russian rat study found apparent generational effects of GEOs with very high death rates in the young of rats fed GE Roundup Ready Soya (56% died) and stunted growth in the surviving progeny.

A programme of UK studies funded by the Food Standards Agency found that genetic engineering routinely causes a large number of random genetic and chemical changes in GE plants, the health impacts of which are unknown.

Two UK trials, one with humans and one with sheep, found that when GE are eaten some of the inserted genes move out and transfer into the gut bacteria.

GE has the potential to cause hemorrhage. Feeding trials by two teams found that GE potatoes cause lesions in the gut wall of rats and mice, and two US feeding trials found that GE tomatoes cause lesions in the gut wall of rats.

At least two trials of different GE found unexplained deaths among the test animals, with 7 of 40 rats (17.5%) in a feeding study of GE tomatoes dying within two weeks, and a 7% mortality rate for chickens fed GE glufosinate-tolerant Chardon LL maize (twice the rate of the non-GE fed chickens).

It should be noted that these studies were designed to identify health impacts and include *toxicological* studies involving tissue analysis. These are different to the various non-toxicological feeding studies frequently referred to by the biotechnology industry, which are primarily carried out to test commercial aspects of GE feed.

Epigenetics (meaning ‘above genetics’)

The actual causes of these effects are not known, but many possible factors could account for them. It has long been known by scientists that the artificial insertion of the genes physically disrupts other genes through the damage caused by the uncontrolled insertion process (‘positional effects’). In addition, the chemical functioning of the new gene interacts with the activity of the plants’ existing genes and biochemical pathways, and so disrupts the metabolism in unpredictable ways.

However, research into the new science of “epigenetics” is also now showing that genes account for only a part of the control of the biochemistry of organisms, and organisms have a level of control above genes that interact with genes. The exact details of this interaction between the rest of the organism and its genes are still far from known. However, this more complete understanding explains why genetic engineering is so unpredictable, with different results produced by each attempt and why the products are often unstable.

Precautionary Principle

Worldwide, the market is withdrawing from GE. The European Union is currently discussing the official withdrawal by the biotech industry of five GE foods and crops: maize Bt176 (Syngenta); canola Ms1xRf1 (Bayer); oilseed rape Ms1xRf2 (Bayer); canola Topas 19/2 (Bayer); and maize GA21xMON810 (Monsanto).

The British Medical Association has warned that there is not enough evidence to state that GE is safe. They have stated that the "precautionary principle should be applied in developing genetically modified crops or foodstuffs, as we cannot at present know whether there are any serious risks to the environment or to human health involved in producing GE crops or consuming GE food products. Adverse effects are likely to be irreversible; once GE is released into the environment they cannot be subject to control".

Any technique that safely increases returns to farmers, including the potential use of GE, should be tried out, but when large-scale commercial planting is planned, all claims must be checked properly, scientifically and independently in Australia. This has not been done for GE canola.

Conclusions

The findings of our report are that GE canola; soya and maize have overall been very negative for North American farmers and the farming industry in general. The independent evidence and feedback from the industry is that overall these GE crops have mostly failed to realize their claimed agronomic benefits and have overall been a disaster economically for the whole farming industry and especially for the organic sector. The large number of problems and negative experiences include the loss of most of the organic canola sector in Canada and lost income for other GE-free producers.

There have been problems of greater reliance on herbicide use, reduced farm incomes, herbicide resistant volunteers, widespread contamination of seed resources, crops, the food system and bulk commodities, a decline in farmer choice over their business options, lost export trade, farm price falls, an increased need for government subsidies and legal liability problems for farmers over company patent rights on GE plants.

In order that Australian farming should be competitive and meet consumer requirements the findings of this report clearly show that the moratorium on the commercial planting of GE crops should remain in place. Any lifting of this moratorium would be an unmitigated disaster for Australian agriculture. Economic impacts on non-GE farmers would be prohibitive and further pressure our agriculture sector that is struggling to adapt to the long-term implications of a drier and hotter continent.

The principal of 'polluter pays' will surely be well tested in the courts further reducing farm income and creating uncertainty and stress. Given that the Government does not directly subsidize the Australian farming sector, it seems mindless to force Australian farmers to compete with their heavily subsidized North American colleagues.

Finally the very real risk that GE crops will be found to cause significant harm to human health and or the environment means that to adopt them into our agricultural system is a very risky proposition. The Biological Farmers of Australia feels it would be far wiser to keep the moratorium in place and to continue to watch how the situation in areas such as North America unfolds.

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Appendix 1. Figures Analysed from Data provided by Max Foster from ABARE.

Month	Canadian(Vancouver) price in $US	Australian domestic price in $US		Aust - Canadian price in $US				
April-05	242	249		**7.11**				
May-05	248	263		**15.01**	**-2926.45**	-$21.52	136 months	
June-05	253	289		**36.15**				
Jul-05	254	288		**33.42**				
August-05	245	267		**21.71**				
Sep-05	237	259		**22.36**				
October-05	225	256		**31.10**				
Nov-05	226	253		**27.04**				
December-05	217	239		**22.40**				
Jan-06	230	235		**5.27**				
February-06	233	245		**12.26**				
Mar-06	235	251		**15.40**				
Apr-06	251	279		**27.76**				
May-06	269	303		**33.52**				
Jun-06	262	315		**53.25**				
Jul-06	272	324		**51.68**				
Aug-06	270	320		**49.65**				
Sep-06	272	326		**53.48**				
Oct-06	292	376		**84.10**				
Nov-06	322	437		**114.88**				
Dec-06	328	447		**119.17**				
Jan-07	334	426		**91.89**				
Feb-07	338	431		**93.48**				
Mar-07	335	428		**92.51**				
Apr-07	344	366		**22.17**				
May-07	360	379		**19.02**	1133.67	$47.24	24 months	
						$68.75	Aust Premium	