The economic pitfalls for the farmer growing GE crops

Pure Hawkes Bay

2012 (Little has changed since this was written)

Introduction

As group of local residents from Hawke's Bay we have been following the experiences in Australia with the acceptance of a GE field crop, the GE Canola. We asked ourselves the question whether the Australian acceptance of a GE field crop has resulted in increased profits for the farmer and the region.

Our firm conclusion is that acceptance of GE field crops brings serious short and long term financial losses for conventional farmers, certified organic farmers ,the servicing industry and a raft of serious liability issues concerning contamination of crops and environmental damage due to increased use of herbicides and pesticides.

We have based our findings on the following reports and contacts:

- The report Failure to yield 2009 by the Union of concerned scientists USA,
- The report Ministerial GMO Industry Reference Group 2009 Australia focused on GE Canola crops,
    - Julie Newman, farmer and spokesperson of the Network of Concerned Farmers Australia, who recently gave a presentation in Clive
- The very comprehensive evidence-based examination of the claims made for the safety and efficacy of genetically modified crops in the report Myths and Truths by Michael Antoniou PhD, Claire Robinson MPhil and

John Fagan PhD June 2012.

Increased costs for the GE technology user

No extra GE crop yield

No premiums for GE crops available on overseas markets.

GE is failing to increase overall yields of staple crops after more than 20 years of GE research and 13 years of commercialization in the United States.
(*Ref:* Union of concerned scientists www.ususa.org Report: Failure to yield 2009)

The increased costs for the farmer using GE Canola Seeds include:

► ***Expenditure relating to technology user agreements and seed premium***

Farmers will be required to purchase new seed and pay seed premium every year as seed is not to be replanted for own use. No seed saving permitted.

Prior to accessing Monsanto's RR canola growers are legally obliged to sign a License & Stewardship Agreement and a Technology Use Agreement.

Growers are also obliged to pay two charges to Monsanto: the Stewardship Fee and the second charge for Grain Technology is a toll per tonne delivered.

The additional yield required to cover the two Monsanto charges (Stewardship and Grain Technology) and additional seed costs will depend on market conditions, size of area planted and yield (Table 3.2).

Table 3.2 Yield required to cover additional GM charges for Roundup Ready Item	**Unit**	**Scenario**			
Area planted	ha	100	100	500	500
Yield without GM technology	t/ha	1.4	0.7	1.4	0.7
Total company GM fees	$/ha	67.78	60.64	59.78	53.64
Additional yield to cover company fee and toll	t/ha	0.14 **9.7%**	0.12 **17.3%**	0.12 **8.5%**	0.11 **15.0%**

Figures from Report: Ministerial GMO Industry Reference group 2009 Australia

► ***The cost of volunteer control***

Dormancy of seed e.g. canola seeds ensures volunteer plants may be present in future crops or land.

► ***Expenditure compliance with resistance management plans***

► ***Segregation***

The increase in farm cost to segregate GM and non-GM in Western Australia has been estimated at between $11.51 and $17.05 per tonne
Figures from Report: Ministerial GMO Industry Reference group 2009 Australia

► ***Identity preservation through the supply chain***

Inadvertent presence is considered unavoidable.

Inadvertent presence can occur in numerous ways such as during the creation of seed stocks between paddocks,47 during harvesting due to lack of adequate cleaning of equipment, and from spillage and human error during storage and handling

It must be noted that possible GM inadvertent levels will exponentially increase with each growing season if GM volunteers are not controlled.

Estimates of possible GM inadvertent levels were initially published by the European Commission Scientific Committee on Plants in 2001.50 A summary of several important European crops 11 has subsequently been published. The Australian Seed Federation used the European Commission 2001 values as a basis to calculate their own estimates.7

► ***any negative environmental risks***

Costs related to increased resistance to herbicides and pesticides and contamination of water

► ***any claims from neighbours for inadvertent presence caused by cross pollination and volunteer plants***

Cross pollination – gene flow via pollen from GM crops to non GM crops. Canola volunteer plants are a potential source of herbicide-tolerant genes, which by gene flow may pass on the tolerance to newly planted canola crops .The main gene flow processes are physical

contact between neighbouring plants, wind dispersal, and transfer by animals and machinery.

The distance wind can disperse canola pollen is generally less than 10 metres with the amount of pollen decreasing as the distance from the pollen source increases. However, outcrossing has been recorded at longer distances.36 .

In Canada, 70 certified non-GM seed samples were tested for GM content by the Saskatchewan Research Centre for Agriculture and Agri-food Canada with the object of assessing isolation distance effectiveness.19. The highest contamination recorded was 7.2 per cent using a 792 metre buffer zone. 19

At present a farmer in Duchembegarra is taking his neighbour to court for in advertent presence of GM Canola seed in his non-GE crop.

- ***Other liability issues***

With the adoption of GM crops, legal matters are likely to arise. Legal issues on a considerable number of key areas have not been defined. GE Seed companies avoid liability by having the farmer client sign a Technology User Agreement by which they are not liable for any loss or damage ever arising from any of their products or services. Could a NZ farmer sue a GE seed company under the NZ Fair Trading Act for losses the genetic engineered seeds have inflicted on their farm's income whether it will be a case of the GE company misleading or deceiving the user or not?

- ***Loss of profitability due to loss free choice***

Once locked in the contracts with the GE seed supplier and plant breeder the farmer has lost his freedom to select the best deals for

- seed purchase
- crop inputs,
- storage and handling
- transport
- trader
- processor
- supermarket and consumers.

Broader range of costs for non- GE growing farmers in the region and the country.

None of the studies from overseas or the limited information available from Australia have accounted for the broader range of costs that may be incurred when growing GE crops.

Costs of liability issues

Non-GM growers are required to ensure the purity of their seed, just as with all other grades of premium grain delivered through the grain industry. Standard operating procedure includes collection of samples from grower deliveries at harvest time for testing after delivery as confirmation that purity is as declared by the farmer. It is the deliverer's responsibility to ensure the product delivered into the grain storage network is declared accurately in relation to variety. Any person disregarding accurate declaration of the load details or falsely stating information commits an offence and is liable to prosecution.

In the event of an inadvertent mix of GM and non-GM canola within the bulk grain storage network, as a result of decisions taken by the bulk store operator, any remedial actions and associated costs would be at the cost of the storage network owner.

Additional costs of segregation of GM and non-GM products in handling, transport and storage

The total cost of handling, transport and storage for all GM and non-GM canola post farm gate to Albany, without segregation, was estimated at $59.9 million over a ten year period.16 The additional costs of segregation, based on 45 per cent of canola growers growing an average of 300 hectares of GM canola, were estimated to range from $2.7 to $5.5 million for the three systems. A conclusion of this study was that to segregate GM and non-GM costs would increase by between 5 and 9 per cent and this was consistent with findings of research in Canada.25

The increase in farm cost to segregate GM and non-GM in Western Australia has been estimated at between $11.51 per tonne in the Esperance region to $17.05 per tonne in the Geraldton region.

Figures from Report: Ministerial GMO Industry Reference group 2009 Australia

Costs of Segregation and identity preservation

While the protocols accept a level of contamination, markets may not and it is argued that the coexistence protocols do not comply with the underpinning principles to enable market choice along the supply chain and provide confidence to all customers.

Royalty Collection

Unlike America and Canada, Australia is signatory to the International Union for the Protection of New Varieties of Plants (UPOV 91) allowing the deduction of end-point royalties on harvested seeds.

The experience of end-point royalty collection of GM soy in Brazil has resulted in non-GM growers paying royalties if a positive test is registered. This implies the trigger for deduction of royalties is set at the level of sensitivity of the tests used which can easily be reached due to accidental contamination.3

Some farmer lobby groups have requested legislative risk management to ensure that the GM company pays for any compulsory qualtitive testing and that a minimum of at least 90 per cent of GM is required before end-point royalties are deducted. In the case of herbicide-tolerant varieties, if 10 per cent of non-GM varieties survive, patent fees should not be applicable as it is evidence that the GM trait (i.e. specific post-emergent chemical applied) has not been used (Percy Schmeisser's Supreme Court decision).3

Costs of compromising markets

The Network of Concerned Farmers estimates the average export price premium for Western Australian non-GM canola is $63 per tonne above the Canadian GM canola.

It is claimed that Western Australian non-GM canola receives a price premium over Canadian GM canola. Certified non-GM canola export to Japan attracts a premium of between $5.90 and $14.16 per tonne

Risk to the Australian market

The Australian Consumer’s Association identified three main health concerns with GM foods.5 The concerns are:

- transfer of antibiotic resistance genes from GM foods to human or animals;

- creation of new allergens or transfer of known allergens from traditional foods into genetically modified variants; and
- current food safety tests do not actually prove that GM foods are safe.

GM canola was approved for commercial release without any long-term feeding trials performed on GM canola oil. The remaining meal escapes regulation as meal is used for stock feed and FSANZ has no authority over stock feed

Consumers also continue to be concerned about the independence of the data used by regulatory agencies to assess safety.

With the increasing importance of the European Union as a market for Western Australia, the canola industry must ensure access is not compromised. A number of Australian companies have a commitment to source non-GM products. Public policy makers should have cognizance of customers' requirements when making decisions.

It has been claimed that the production of GM canola in Western Australia may adversely impact on the price received for other export commodities such as wheat and livestock. This claim is discredited by other industry observers.

Legal issues not defined may lead to bankruptcy of the GE farmer and non-GE farmer

GE Seed companies though avoid liability by having the farmer client sign a Technology User Agreement

Seed suppliers, growers, primary industry service providers and marketers who handle GM crops have legal responsibilities. Legal issues that might arise in the event that GM crops were accepted in a region:

Legal issues that need to be considered are listed below:

- *The adequacy of the legal framework to protect farmers whose crops and/or land inadvertently receive GM?*
- *Do we have adequate legal provisions to determine whether an owner of such material should remove it from contaminated sites?*
- *Do we have an adequate legal framework that can enable the identification of the owner of such material?*

- *Does the current law adequately protect people for inadvertent infringement of the technology user and end point royalties agreements?*
- *Is the reliance on common law rather than statute law an adequate response to new technology?*
- *Will reliance on the common law, as opposed to statute law, be likely to result in increased or more complicated litigation between neighbours?*
- *Would a statutory legal framework provide more clarity and assistance, by codifying rights, responsibilities, practices and sanctions, than common law?*
- *If such codification is not required in introducing GM technology, why does it exist in laws regulating the introduction of previous new technologies?*

Safety and Efficacy of GE crops

In June 2012 Michael Antoniou PhD, Claire Robinson MPhil and John Fagan PhD published a very thorough evidence-based examination of the claims made for the safety and efficacy of GM Crops.

For councilors of the Hawkes Regional Council and Hawkes Bay District Council we made an abstract of the findings as described in their report of 123 pages.

Further details can be studied in their publication Myths and Truth available on link *http://earthopensource.org/index.php/reports/58*

1. The genetic engineering technique

Genetic engineering is different from natural breeding and poses special risks

Genetic engineering is crude and imprecise, and the results are unpredictable

Mutation breeding brings its own problems and should be strictly regulated

Cisgenic/intragenic foods are just as risky as any other GM food

- Genetic engineering is completely different from natural breeding and entails different risks. The genetic engineering and associated tissue culture processes are

imprecise and highly mutagenic, leading to unpredictable changes in the DNA, proteins, and biochemical composition of the resulting GM crop that can lead to unexpected toxic or allergenic effects and nutritional disturbances.

- Foods produced by cisgenic or intragenic methods are as hazardous as any other GM crop.
- It is misleading to compare GM with radiation-induced mutation breeding and to conclude that, as crops bred by the latter method are not tested for safety or regulated, neither should GM crops be tested or regulated. Radiation-induced mutation breeding is potentially even more mutagenic than GM, and at least as destructive to gene expression, and crops produced by this method should be regulated at least as strictly as GM crops.
- It is unnecessary to take risks with GM when conventional breeding – assisted by safe modern gene mapping technologies – is capable of meeting our crop breeding needs

2. Science and regulation

GM food regulation in most countries varies from non-existent to weak

- The regulatory regime for GM crops and foods is too weak to protect consumers from the hazards posed by the technology. Regulation is weakest in the US, but is inadequate in most regions of the world, including Europe.
- The US regime assumes that GM crops are safe if certain basic constituents of the GM crop are "substantially equivalent" to those of their non-GM counterparts – a term that has not been legally or scientifically defined. The European regime applies the same concept but terms it "comparative safety assessment". However, when systematic
- scientific comparisons of a GM crop and its non-GM counterpart are undertaken, the assumption of substantial equivalence is often shown to be false.
- Pro-GM lobbyists have weakened the regulatory process for GM crops, including through the industry-funded group ILSI. No long-term rigorous safety testing of GMOs is required and regulatory assessments are based on data provided by the company that is applying to commercialise the crop.
- The GM industry restricts access to its products by independent researchers, so effects on health and the environment cannot be properly investigated.
- Independent researchers who have published papers containing data that is not supportive of GMOs have been attacked by pro-GM industry groups and individuals (the "shoot the messenger tactic")

3. Health hazards of gm foods

Studies show that GM foods can be toxic or allergenic

EU research shows evidence of harm from GM foods

Studies that claim safety for GM crops are more likely to be industry-linked and therefore biased

The few studies that have been conducted on humans show problems

There is no scientific evidence to support that o one has ever been made ill by a GM food

GM Bt insecticidal crops pose hazards to people and animals that eat them

No thorough allergenicity testing is conducted on GM foods

GM feed affects the health of animals and may affect the humans who eat their products

No GM crop that is more nutritious than its non-GM counterpart has been commercialised and some

GMOs are less nutritious

- Peer-reviewed studies have found harmful effects on the health of laboratory and livestock animals fed GMOs. Effects include toxic and allergenic effects and altered nutritional value.
- Most animal feeding studies on GMOs have only been short-term or medium-term in length. What is needed are long-term and multi-generational studies on GMOs to see if the worrying changes commonly reported in short- and medium-term studies develop into serious disease. Such studies are not required by government regulators.
- Industry and regulators dismiss findings of harm in animal feeding trials on GMOs by claiming they are “not biologically significant” or “not biologically relevant” – scientifically meaningless terms that have not been properly defined.
- No GM nutritionally enhanced (biofortified) foods are available on the market. In contrast, conventional plant breeding has successfully and safely produced many biofortified foods.
- The most-hyped GM nutritionally enhanced food, Golden Rice, aimed at combating vitamin A deficiency, has wasted millions in development funds – yet has not been proven safe to eat and is still not ready for the market. Meanwhile, proven and

inexpensive solutions to vitamin A deficiency are available and only need proper funding to be more widely applied.
- Conventional plant breeding has successfully and safely produced many biofortified foods

4. Health hazards of Roundup and glyphosate

Roundup poses major health hazards

- Roundup, the herbicide that most GM crops are engineered to tolerate, based on the chemical glyphosate, is marketed as a "safe" herbicide, based on outdated and largely unpublished studies by manufacturers.
- But laboratory and epidemiological studies confirm that Roundup poses serious health hazards, including endocrine (hormone) disruption, DNA damage, cancer, birth defects, and neurological disorders
- Some of these effects are found at low, realistic doses that could be found as residues in food and feed crops and in contaminated water. People who eat foods made from GM crops could be ingesting potentially dangerous levels of Roundup residues.
- Roundup and glyphosate have been detected in air, rain, groundwater, in people's urine, and even circulating in women's blood. Glyphosate can cross the placental barrier and the unborn foetus could thus be exposed.
- The "safe" dose for Roundup exposure set by regulators is not based on up-to-date objective evidence; thus current regulations do not protect the public.

5. GM crops – impacts on the farm and environment

GM crops do not increase yield potential – and in many cases decrease itGM crops increase pesticide use

Claims of environmental benefits from GM no-till farming are unsound

GM Bt crops merely change the way in which insecticides are used

GM Bt crops are not specific to pests but affect a range of organisms

Roundup persists in the environment and has toxic effects on wildlife

Roundup causes soil and plant problems that impact yield

The herbicides used with GM crops harm biodiversity

Economic impacts of GM crops on farmers are variable

Co-existence means widespread contamination of non-GM and organic crops

GM contamination has had severe economic consequences for farmers, food and feed companies, and

markets

GM genes can escape into the environment by horizontal gene transfer with potentially serious

Consequences

- GM does not increase intrinsic yield. Some GM crops have lower yields than non-GM counterparts.
- GM crops have increased pesticide use by 383 million pounds in the US in the first 13 years since their introduction.
- The modest reduction in chemical insecticide sprays from GM Bt insecticidal crops is swamped by the large increase in herbicide use with GM herbicide-tolerant crops.
- GM herbicide-tolerant crops have caused an over-reliance on a single herbicide, glyphosate, leading to the emergence of resistant super weeds and causing farmers to use more herbicides, including older toxic ones like dicamba and 2,4-D.
- The GM companies' solution to the glyphosate-resistant superweeds problem is stacked trait GM crops that tolerate applications of multiple herbicides – and mixtures of herbicides. Weed scientists warn that this will cause herbicide use to triple, foster multi-herbicide-resistant superweeds, and undermine sustainable farming.
- Claims of environmental benefits from no-till of farming as used with GM herbicide-tolerant crops collapse once herbicide use is taken into account.
- GM Bt crops do not eliminate insecticide use – they merely change the way in which insecticides are used. The plant itself becomes an insecticide.
- GM Bt technology is being undermined by the spread of insect pests that are resistant to Bt crops, forcing farmers to use chemical insecticides as well as buying expensive Bt seed.
- Bt toxins in GM Bt crops are not specific to insect pests, but harm beneficial insect pest predators and soil organisms.
- Roundup used on GM herbicide-tolerant crops is not environmentally safe. It persists in the environment and has toxic effects on wildlife as well as humans (section 4).

- Roundup increases plant diseases, notably Fusarium, a fungus that causes sudden death and wilt in soy plants and is toxic to humans and livestock.
- The economic impacts on farmers of adopting GM crops were described in a study for the US Dept. of Agriculture as “mixed or even negative
- **“**Coexistence” between GM and non-GM crops is impossible as non-GM and organic crops become contaminated, resulting in lost markets and massive economic losses.
- The possibility that GM traits could spread not only to related species by cross-pollination but also to unrelated species by horizontal gene transfer, should be investigated before commercialising GM crops.

6. Climate change and energy use

Conventional breeding outstrips GM in delivering climate-ready crops

No-till farming does not sequester more carbon

GM has not delivered nitrogen-efficient crops

GM crops are energy-hungry

- GM will not solve the problems of climate change. Tolerance to extreme weather conditions involves complex, subtly regulated traits that genetic engineering is incapable of conferring on plants.
- Most GM crops depend on large amounts of herbicides, which in turn require large amounts of fossil fuels in manufacture.
- No GM nitrogen-use-efficient crops have been successfully commercialised even though promoters of the technology have been promising them for more than a decade.
- Conventional breeding is far ahead of GM in developing climate-ready and nitrogen-use-efficient crops.
- Additional means to cope with climate change include the many locally-adapted seeds conserved by farmers across the world and agro ecological soil, water, and nitrogen management systems.

7. Feeding the world

GM crops are irrelevant to feeding the world

Agro ecological farming is the key to food security

Non-GM breeding methods are more effective at creating crops with useful traits

- GM crops are promoted as necessary to feed the world's growing population. But it seems unlikely that they could make a significant contribution as they do not deliver higher yields or produce more with less inputs than non-GM crops.
- Most GM crops are engineered to tolerate herbicides or to express a pesticide – properties that are irrelevant to solving hunger.
- Hunger is not caused by a lack of food in the world. It is a problem of distribution and poverty, which GM cannot solve.
- The IAASTD report, authored by over 400 international experts, concluded that the key to food security lay in agro ecological farming methods. The report did not endorse GM, noting that yields were "variable" and that better solutions were available.
- Agro ecological farming has resulted in significant yield and income benefits to farmers in the Global South, while preserving soil for future generations.
- GM is not needed to feed the world. Conventional plant breeding has already delivered crops that are high-yielding, disease- and pest-resistant, tolerant of drought and other climatic extremes, and nutritionally enhanced – at a fraction of the costs of GM.