ORGANIC FARMING OR GENETIC ENGINEERING?

Our GE~free future

ECOLOGICALLY SUSTAINABLE FARMING - FOR NAMBUCCA SHIRE AND BEYOND

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NAMBUCCA VALLEY CONSERVATION ASSOCIATION INC. 2009

WHY ORGANICS AND A GE FREE NAMBUCCA

Genetic engineering (GE) is ecologically unsustainable and unacceptable – it threatens human health, ecological integrity and economic viability. Yet, despite widespread public opposition, the Office of the Gene Technology Regulator (OGTR) and Food Standards Australia New Zealand (FSANZ) continue to allow genetically engineered organisms into our fields and onto our plates.

The approval processes for genetically engineered crops and foodstuffs do not consider whether or not they are ecologically sustainable nor if they will affect human health in the long term. Creating such risks to our environment, our health, and our economy is unacceptable – we need to ensure any agricultural development is ecologically sustainable for both present and future generations.

Organic agriculture holds the promise of sustainability – a more healthy society, a less polluted environment and increased economic opportunity. Genetic engineering and organic agriculture cannot co-exist – therefore we need to choose which path we will take.

Front cover: "Spores on the wind"
Original artwork by Chris Campbell.

Image (right):
Tony Allison, NSW, 2008.

SETTING THE SCENE

GENETIC ENGINEERING IN OUR BACKYARD

Trial crops of genetically engineered (GE) roses, cotton, wheat, rice, papaya, Indian mustard, sugarcane, canola, carnation, grapevine, pineapple and poppy have been grown in Australia since at least 1995. Unrestricted commercial cultivation of GE carnations and cotton in Australia occurred in 1995 and 1996, respectively (OGTR, 2008). The NSW government recently lifted the GE moratoria on the commercial cultivation of GE canola despite 57% of people surveyed opposing it - ('The Land', 2007).

Like other NSW local government areas, the Nambucca Shire is not safe from GE organisms. While no GE crops are currently grown here, both human and animal food that contains GE ingredients are sold in the Nambucca Shire.

The Office of the Gene Technology Regulator ('the Regulator')– the body that oversees the introduction of GE organisms - wrote to Nambucca Shire Council (NSC) twice during 2007 and asked for comment on the commercial release of GE cotton and on the commercial release of a transgenic 'glofish' (NSC, 2007). Council did not comment.

There are no GE crops currently grown in the Nambucca Shire: Let's keep it that way.
South Arm, Nambucca Valley, Lyn Orrego 2008.

"Which path will we take?"

The NSW Government has recently lifted the moratorium on the commercial growing of genetically engineered canola. However, there is opportunity for local governments, including the Nambucca Shire Council, to act, and declare their regions Genetic Engineering Free Zones.

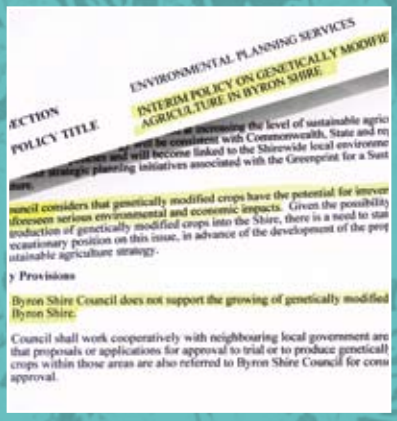
LOCAL GOVERNMENT ASSOCIATION POLICY STATEMENT

"Until irrefutable evidence is provided which demonstrates that there are no adverse direct or indirect impacts of genetically modified crops, the Local Government Association remains opposed to their use in any area. Each local government area be given the right to declare itself a genetically modified free zone."

LGA, 2005.

All local governments have an obligation to ensure the principles of ecologically sustainable development (ESD) are met. Many other NSW local government bodies including Coffs Harbour, Newcastle and Byron Shire have taken a stance against GE.

These Councils have declared their regions to be GE Free Zones or have expressed opposition to GE. Actions taken include adoption of the precautionary approach and amendment of their Local Environment Plan to reflect their position on GE (LGSA, 2003). The Nambucca Shire Council can, and should, do the same.



ENVIRONMENTAL PLANNING SERVICES

INTERIM POLICY ON GENETICALLY MODIFIE AGRICULTURE IN BYRON SHIRE

ECTION

POLICY TITLE

ncil considers that genetically modified crops have the potential for unfore foreseen serious environmental and economic impacts. Given the possibility oduction of genetically modified crops into the Shire, there is a need to stat cautionary position on this issue, in advance of the development of the prop stainable agriculture strategy.

y Provisions

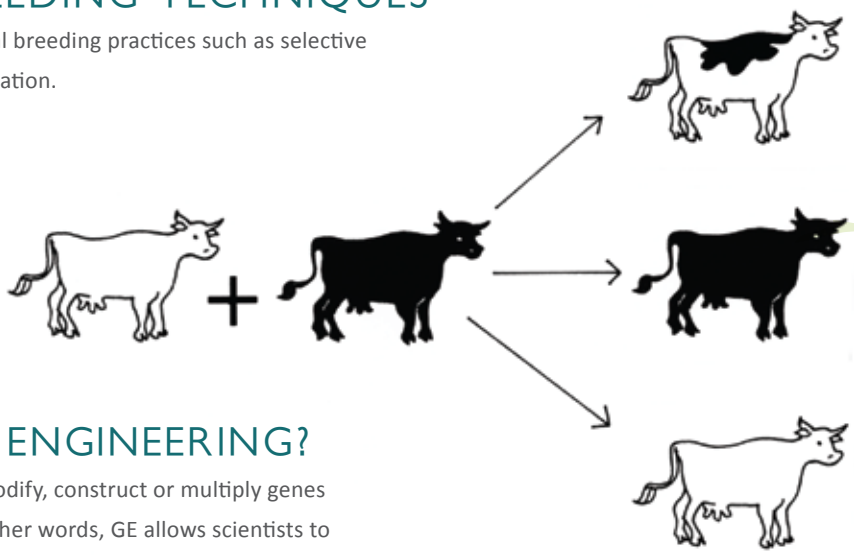
Byron Shire Council does not support the growing of genetically modified Byron Shire.

Council shall work cooperatively with neighbouring local government are that proposals or applications for approval to trial or to produce genetically crops within those areas are also referred to Byron Shire Council for consi approval.

Byron Shire Council does not support the growing of genetically modified crops in the Byron Shire.
Byron Shire document. Lyn Orrego, 2008

TRADITIONAL BREEDING TECHNIQUES

GE is not a mere extension of traditional breeding practices such as selective breeding, hybridisation and cross-pollination.



Traditional breeding techniques stay within the same species. *Drawing, Julie Mozsny, 2008.*

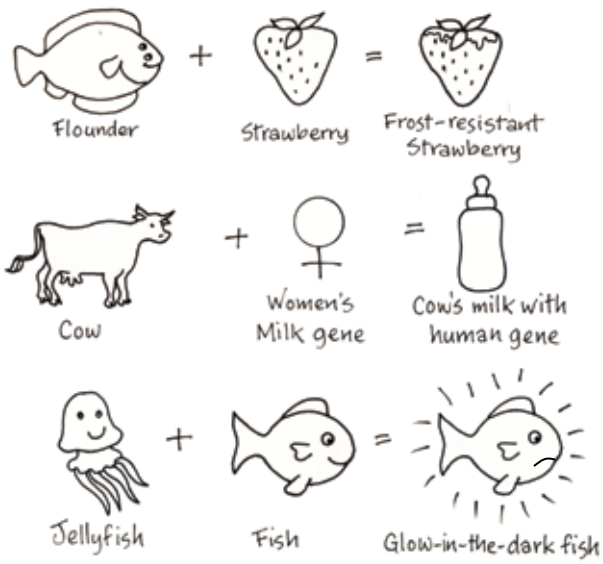
WHAT IS GENETIC ENGINEERING?

GE allows scientists to move, delete, modify, construct or multiply genes within a new or existing organism. In other words, GE allows scientists to create organisms that do not occur naturally. To do this, scientists isolate the desired gene, attach it to a carrier (which is usually a virus) and insert it into the plant or animal. Usually, an antibiotic marker gene is also inserted to allow scientists to tell if the engineering has been successful.

One technique used to insert this combination is called microprojectile bombardment: using a special gun, scientists attach the new gene to a tiny piece of gold or tungsten and shoot it into the host organism – for example, a cow or canola plant.

WHAT IS GE?

Most controversially, GE allows scientists to cross the barriers that have kept species apart for millions of years: this type of GE is known as 'transgenics'. Numerous transgenic creations already exist – scientists have mixed strawberries with Atlantic flounder genes to make strawberries frost-resistant and combined luminescent jellyfish with fish in order to make glow-in-the-dark fish. Scientists have made plants survive being sprayed with deadly chemicals (Trulove, 2000; OGTR, 2008), and have even started putting human genes into cows to make babies' milk ('New Scientist', 1997).



Transgenics, a type of genetic engineering *Julie Mozsny, 2008.*

"Transgenics" Species are combined – offspring has never before existed and could not occur naturally.

GE allows scientists to cross the barriers that have kept species apart for millions of years ... it is not a mere extension of traditional breeding practices such as selective breeding, hybridisation and cross-pollination. GE allows scientists to move, delete, modify, construct or multiply genes within a new or existing organism.

In other words, GE allows scientists to create organisms that do not occur naturally.

GENETIC ENGINEERING: AN UNSUSTAINABLE TECHNOLOGY

Our past experiences with the horrors of thalidomide, asbestos and DDT have taught us that we need to be cautious when introducing technological developments such as GE into our society and our environment. For this reason, our society has decided that any development needs to be ecologically sustainable (NSESD, 1992). GE falls well short of this. Ultimately, the introduction of GE could harm our environment, health and economy.

IS GE SUSTAINABLE?

ENVIRONMENTAL INSTABILITY

To be environmentally sustainable, GE should help maintain ecological processes, life-support systems and protect biodiversity (NSESD, 1992). Yet the fertility of GE organisms threatens to disrupt ecosystems and lead to the displacement and extinction of existing species (NRC, 2002).

In the case of GE salmon, compared to their natural counterparts, their heightened growth rate and faster feeding ability means that this GE organism has the potential to pass genes onto wild relatives and to out-compete its natural counterparts (NRC, 2002).

Insecticide and herbicide resistance poses further threats to environmental stability. Insects can become resistant to the engineered plants, and have already shown such resistance to INGARD® cotton in Australia (Pyke, 1999; Gunning, 2005). Viruses can re-combine with transgenes and create new and stronger strains that require new methods to be developed to control them (Gal, 1992; Greene, 1994).

GE plants have not lived up to claims made by biotechnology corporations... rather than our environment and developing nations benefiting from GE crops, multinational corporations reap most of the rewards...

The potential creation of 'superweeds' also risks upsetting ecological processes and the arrival of such plant species affects the type and amount of herbicide used. Superweeds arise through cross-pollination of GE varieties engineered for herbicide resistance with their wild counterparts. This has occurred in Canada where GE canola and wild mustard have cross-pollinated, and herbicide resistance has been conferred to the wild population (Warwick, 2007). A similar concern exists in Australia concerning GE canola and wild radish.

In many cases, the situation is worse than before GE varieties were introduced: a report on the pesticide usage on all major commercial herbicide-tolerant crops (soybean, cotton, and canola) throughout the US during 1996 - 2003 concluded that pesticide use had increased overall by 70 million pounds (31.8 million kgs) (Benbrook, 2003). Pesticide use also increased in Australia during 1996 – 1999 when cotton growers found Monsanto's INGARD® transgenic insect resistant cotton, to be under-performing (Pyke, 1999). Since then, overall pesticide use in the Australian cotton industry has declined, but in future, is likely to increase as GE varieties enable expansion of the cotton industry (AATSE, 2002).

More toxic herbicides applied at higher frequency rates impact on non-target organisms and biodiversity. GE is not sustainable because of the negative impacts on agriculture and the environment. GE's reliance on increasing use of pesticides and herbicides highlights it unsustainability. The impacts of GE on Australian biodiversity, especially its intergenerational effects, are largely unknown: the Regulator has not undertaken study on this important issue.

CSIRO has also noted the unknown ecological threats of a transgene's ability to build up in soils and thereby persist in the environment (Vadakattu, 2004). Some studies however indicate potential effects to biodiversity from the escape of transgenic plants: The potential spread of virus-resistant white clover on south-eastern Australian subalpine and alpine environments has raised concerns over species decline (Godfree, 2004). In the face of such uncertainty, one would rationally conclude that it is preferable to take a precautionary approach than to risk further harm to our already degraded environment.

Toxic herbicides impact on non-target organisms and erode biodiversity.
Jenni Jones, USA, 2006.

Impacts of GE on biodiversity are largely unknown.
Bee in flower. Tony Allison, NSW, 2008.

A report on the pesticide usage on all major commercial herbicide-tolerant crops in the US during 1996 - 2003 concluded that pesticide use has increased by 31.8 million kgs.

(Benbrook 2003.)

Pesticide pouring. USDA, 2008

IMPACT ON YOUR HEALTH

Around the world, GE food has been shown to have adverse effects. The potential for new allergens to be created poses real concern: allergens associated with Brazil nuts were inadvertently transferred from Brazil nut genes into soybeans during engineering (Ordlee, 1996). There is evidence that people may be allergic to GE soybeans but not to non-engineered varieties (Hye-Yung, 2005).

There was a 50% increase in soy allergies in the UK in 1998, which correlated with the introduction of GE soy into the UK. This placed soy in the top ten allergenic foods for the first time in seventeen years of testing (Smith, 2007).

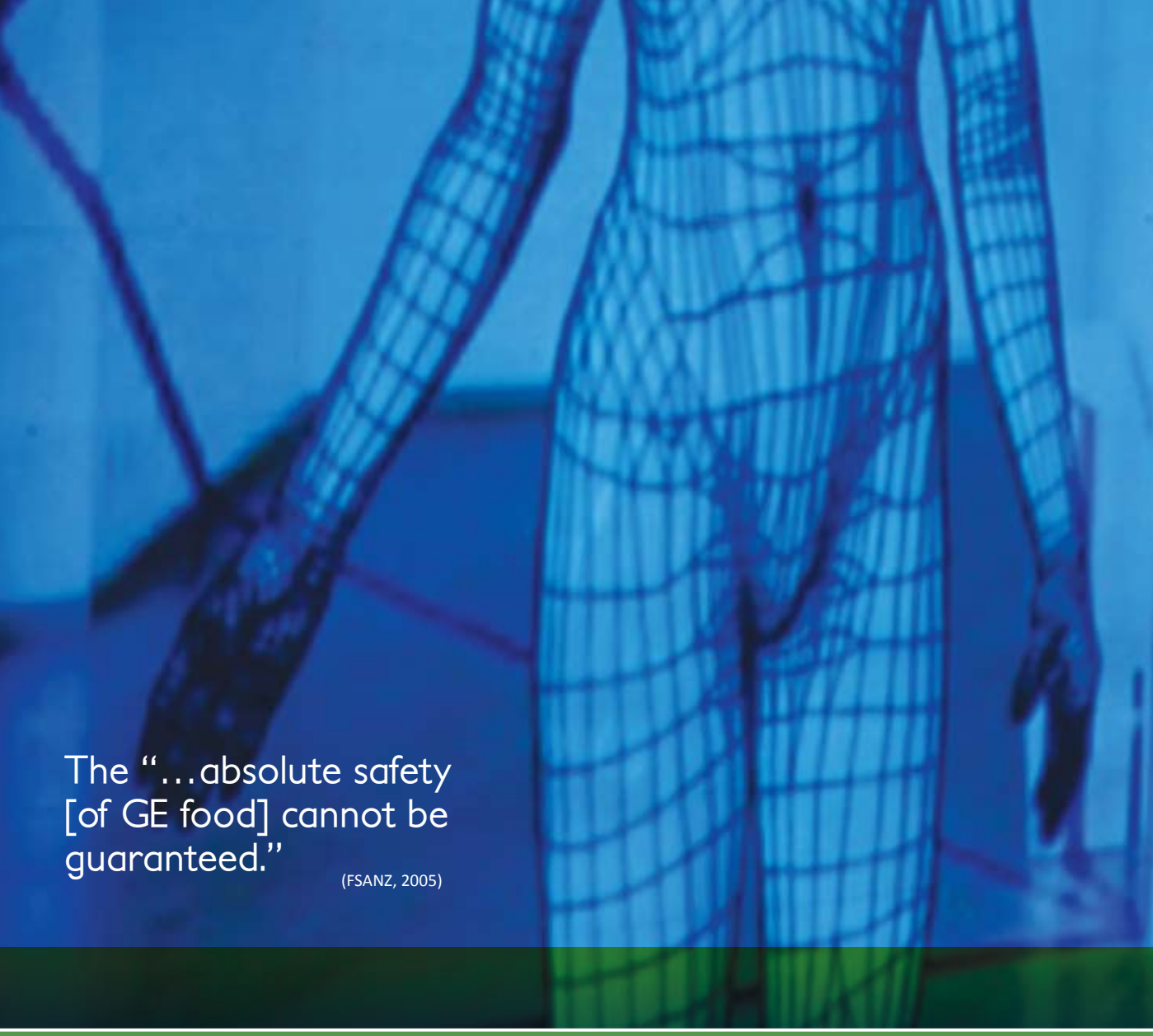
Allergies may also develop from handling GE varieties. Twenty-three cases of allergic reactions arising from picking, loading, weighing and separating Bacillus thuringiensis (Bt) cotton fibre have been reported in Madhya Pradesh, India. Mild and severe symptoms included itching, skin eruptions, swelling, nasal discharge, sneezing, and lesions (Gupta, 2005). The potential for such allergic reactions in the finished product is of concern - such effects are not monitored for by FSANZ. Allergic reactions, headaches, dizziness, extreme stomach pain, vomiting, chest pains, fever, respiratory, intestinal and skin reactions have been associated with Bt corn pollen in the Philippines. Most of the ninety-six people affected in the village of Sitio Kalyong in 2003 remain ill and villagers have attributed five unexplained deaths to the Bt corn. Similar reactions were reported in other villages using the same Bt variety (Mae-Wan Ho, 2006).

HEALTH IMPACTS

Thirty-seven fatalities have been associated with GE food supplements.

In 1989 a company called Showa Denko in the USA produced a new brand of a supplement called L-tryptophan. Subsequently, approximately 5,000 people were afflicted with a disease called Eosinophilia Myalgia Syndrome and 1,500 people were left with permanent disabilities such as paralysis, chronic neurological problems, swelling and cracking of the skin, heart problems and extreme sensitivity to light. However, the cause of the deaths and disabilities cannot be scientifically proven, as, following the recall of the product, Showa Denko destroyed all batches of the modified bacteria and blamed the illnesses and deaths on impure purification processes (Crist, 1994).

Unfortunately, potential impacts on human health are not limited to adults – nor the current generation. “There is also evidence in animal studies that some small RNA [ribonucleic acid] molecules can be transmitted through food, causing lasting, sometimes inheritable, effects on consumers and their children” (Heinemann, 1995). At least one GE corn variety approved for consumption by FSANZ has this feature – LY038. It was approved in 2006.



The "…absolute safety [of GE food] cannot be guaranteed." (FSANZ, 2005)

Food Standards Australia New Zealand (FSANZ) does not guarantee that GE food is safe to eat in the long term – its "…absolute safety cannot be guaranteed" (FSANZ, 2005). Even some GE food approved as safe by FSANZ is the subject of controversy. Independent studies have shown that some of the food approved for consumption in Australia (for example Monsanto's insect-resistant corn, MON 863 and Monsanto's NK 603 maize) has badly affected test animals, giving them stomach lesions, internal abnormalities and resulting in smaller internal organs (CRIIGEN, 2007a, 2007b).

Given that GE has already had such serious side effects and has the potential to affect children, both born and unborn, allowing GE crops into our food chain is unacceptable. The serious potential for GE to negatively impact on human health should be enough to prompt the relevant authorities to take notice of the public outrage over GE crops and ban GE crops entirely.

Allergic reactions, headaches, dizziness, extreme stomach pain, vomiting, chest pains, fever, respiratory, intestinal and skin reactions have been associated with Bt corn pollen.
Tony Allison, NSW, 2008.

IMPACTS ON OUR ECONOMY

In food and agriculture, it is questionable whether GE will be economically viable, now or in the future. It may actually create economic uncertainty both for individual producers and for entire agricultural industries. Claims of higher returns from yield increase are conflicting or unsupported: Canadian transgenic canola displayed a decline in yield during 1999 and a slight increase in 2000 (ABARE, 2006). No yield increase was shown for Australian cotton growers during 2000 – 2005. Further, technology fees were considerably higher than those for non-engineered varieties (Brookes, 2005).

The most widely grown GE crops - soybeans, maize, cotton and canola– are engineered to be tolerant to herbicides and for insect resistance (FAO, 2004). These features benefit the biotechnology corporations – not only do these corporations receive income from patents attached to seed, farmers are contractually required to use only pesticide produced by the same company which produces the seed. These requirements lead to high financial costs for farmers both in Australia and abroad. In Australia licensing fees for herbicide-resistant and insect-resistant cotton during 2005 were around US$50 and US$250 per ha respectively (Brookes, 2005).

There are other, more severe, ramifications of economic loss associated with GE crops for poor farmers in developing nations. It is reported that in India the failure of GE cotton seed to live up to claims of insect-resistance has led to farmers being unable to meet their contractual obligations – and, tragically, some have resorted to suicide (UNESCO, 2008).

ECONOMIC IMPACTS

The market economy depends on supply and demand. However, people and markets around the world reject GE products and demand suppliers guarantee their product's GE free status. So it is difficult to see how GE could ever enhance our international economic competitiveness. Even major Australian producers and retail chains such as Hungry Jacks, Sanitarium and Heinz refuse to use GE ingredients in their products and insist that milk is sourced from cows that have not been fed GE fodder (True Food Network, 2008). A recent online poll of 4,335 voters by the 'Sydney Morning Herald' found 89% against GE crops, and only 8% in support (SMH, 2007).

Sustainability requires the full costs of production to be paid by the user (and creator) of the technology. This includes environmental costs such as genetic pollution and species decline. The final pricing should reflect these costs. However, costs of trying to keep engineered and non-engineered varieties apart are largely paid by those who do not use the technology. Attempting to keep their products segregated is expected to cost traditional farmers 5 – 15% of the value of their produce (ABARE, 2006), which ultimately leads to higher costs for non-engineered varieties. Furthermore, environmental costs from genetic pollution and species decline are not met by those releasing or using gene technology.

October 5th 2005 Wimmera, Victoria: Canola farmer Geoffrey Carracher in Wimmera, Victoria is devastated that his non-GE farm has 0.5% contamination with Bayer's Liberty Link gene. Farmers in NSW, SA and Vic who sowed "Grace"canola should all test their fields. The incident opens up a legal minefield for farmers. *(C)Greenpeace/Harrison*

Expecting our environment and non-GE farmers to carry the costs incurred due to the escape of GE organisms is unjustified.

Expecting our environment and non-GE farmers to carry the costs is unjustified and carries the potential to result in a less diverse environment and a more constrained economy.

Costs arising from losses incurred due to the escape of GE organisms, or from contamination of goods, are distributed throughout the supply chain (DAFF, 2003). Organic farmers are particularly at risk. If their crops are contaminated they lose their organic status and market opportunities. If the Australian legal situation follows that of Canada, farmers will not be able to save any seed that contains a GE gene – under patent law it becomes the property of the company which created it.

Legal advice obtained by the Nambucca Valley Conservation Association Inc, indicates that if a farmer saves and grows patented GE seed without a licence, even where the presence of the GE variety originated from pollen or seed drift, he or she could be sued. This occurred in the Canadian case, Monsanto Canada Inc v Percy Schmeiser – and it is likely that the findings of that case would be applied in Australia if a similar situation arose. This is especially worrisome in light of the recent lifting of the NSW State Moratorium on genetically engineered canola.

Image (above)
31 March 2006 Albons, Girona, Spain. Organic Maize farmer Enric Navarro in his farm. He decided to destroy two thirds of this season's organic maize crop after routine testing discovered up to 12.6% of his crop was contaminated from genetically engineered maize. The farmer suffered major economic loses due to contamination as he could no longer claim organic status for his crop, he then made the decision to destroy the crop rather than further contaminate the food chain.
(c)Greenpeace/Sancho

Key liability issues associated with the unintended presence of GMOs	
GM Seed Manufacturers and Suppliers	• Breach of Contractual Warranties • Nuisance • Negligence • Fair Trading Legislation
GM Farmers	• Breach of contractual warranties • Gene Technology Act 2000 (Cth) and corresponding State legislation • Trespass • Nuisance • Negligence
Non-GM, Organic and GM-free Farmers	• Infringement of a seed manufacturer's intellectual property rights • Gene Technology Act 2000 (Cth) and corresponding State legislation • Breach of contractual warranties • Fair trading legislation (misleading and deceptive conduct re GM status)
Transporters and Harvesters	• Breach of contractual warranties • Trespass • Negligence
Bulk Handlers	• Breach of contractual warranties • Fair Trading legislation • Negligence
Manufacturers and Retailers	• Australia New Zealand Food Standards Code • Fair trading legislation

Source: DAFF 2003

GE and Organic Agriculture: At a Glance		
Characteristics	**Organics**	**Genetic Engineering**
Underlying paradigm		
Overall approach to nature	Holism Harmony Diversity Restraint Stabilisation	Reductionism Domination Specialisation Exploitation High Uncertainty
Principles of Ecologically Sustainable Development		
Overall compatibility	Promotion of principles	Disregard for principles
Governing law/standard	In line with principles	Most principles – "outside the Act"
Economic		
	Consumer and market acceptance Seed saving potential Liability not an issue	Consumer and market rejection High patent fees – cannot collect seed Distributed liability
Ecological		
Basic Unit	Agro-ecosystem	Cell
Basic principles	Ecology	Genetics: cell biology
Design	Self-design (with some human help)	Human design
Biodiversity	Protected Genetic diversity enhanced System diversity	Changed Erosion of genetic diversity Promotion of monoculture
Pollution	No synthetic chemicals used No groundwater pollution from chemicals No air pollution from chemicals No soil pollution from chemicals	Chemicals incorporated in plant DNA Risk of more toxic and frequent chemical applications
Maintenance and development costs	Reasonable	Exorbitant
Social		
Control	Farmers and community	Corporations/corporate state
Organisation	Decentralisation Independence Community/interdependence Local	Centralisation Dependence Competition Global
Intra and inter - generational concerns/obligations	Increased health Promotion of right to food Promotion of freedom of choice Environmental stewardship	Increased health risks, esp. for children Loss of freedom to choose suitable foods Limited ability to choose Environmental domination

Source: adapted from Hindmarsh 1995

ECOLOGICALLY SUSTAINABLE DEVELOPMENT (ESD)

In Australia, 'sustainability' encompasses the concept of ecologically sustainable development (ESD). The National Strategy for Ecologically Sustainable Development is endorsed by the Council of Australian Governments. It defines ESD as "using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased." The National Strategy applies to all levels of society – "the participation of every Australian - through all levels of government, business, unions and the community - is central to the effective implementation of ESD in Australia" (NSESD, 1992). This means at every level, development needs to be ecologically sustainable.

'Development' occurs when events or processes bring about environmental, economic and social change - 'development' is not just house construction, or building houses and roads, but includes the 'use of land'. So, agriculture, forestry and fisheries are 'developed' when new technologies, such as GE, are introduced. This means that the introduction of GE organisms into Australia should meet all the principles of ESD – and that all of those principles should be given equal weight.

Image (right):
Tony Allison, NSW, 2008.

ESD

To be sustainable GE would need to conserve and increase our community resources. This means that GE would need to allow us to keep going in a way that is beneficial to (1) our environment, (2) our economy and (3) both present and future generations.

However, the Gene Technology Act (GTA) does not require the Regulator to consider all the principles of ESD when considering an application to environmentally release a GE organism. Perhaps this is not surprising given that the environmental release of GEOs in Australia falls well short of being ecologically sustainable development.

Unacceptable and Unsustainable: A Risk-Based Approach

Rather than assess applications for the release of GE organisms into our environment using the broad principles of ESD, the GTA requires a much narrower approach be taken – one that only looks at whether risks to human health and the environment are manageable and acceptable. Focusing only on such risks means that considerations such as intergenerational equity and impacts on our economy, are simply omitted from the equation.

GE would also have to meet the "7" guiding principles of ESD:

1. Long term and short term goals to be included
2. Precautions to prevent environmental degradation
3. Consideration of global impacts of decisions and actions
4. A strong, growing and diversified economy that protects our environment
5. Environmentally friendly enhancement of our international market competitiveness
6. Adopting cost effective and flexible policies that promote sustainability
7. Broad community involvement.

The precautionary principle found in the GTA is weaker than that found in ESD and used in other environmental legislation: postponing environmental damage is only required if it is cost effective (GTA, s 4). Moreover, the GTA only requires the GTR to apply this weaker precautionary principle in the regulatory framework. The GTA is unclear about whether the GTR is required to apply the precautionary principle when making decisions about the environmental release of a GEO.

Perhaps the reason why the Regulator looks at managing risks is because it is impossible to prevent harm occurring. Buffer zones and netting just cannot control the escape of pollen; human error, animal carriers, transport vehicles and storage facilities are bound to transport pollen and seeds.

The non-governmental GM Contamination Register notes a total of 216 cases, 9 of which have occurred in Australia since 2000 (Greenpeace, 2007). Eight of those cases involved contamination with both approved and unapproved varieties, with the last reported incident concerning insect resistance. Contamination was the result of human error, cross-pollination, failure of segregation programs and imported seed (GM Contamination Register). It is fair to assume that many more cases of unintentional contamination remain unreported.

GE canola knows no boarders. Greenpeace Ardno, Victoria, Australia 16 March 2008: Greenpeace activists trained in procedures for dealing with genetic hazardous materials, have entered a genetically engineered (GE) canola field trial near the border of South Australia. The activists have unfurled a giant 20m x 30m banner in the field, reading 'GE CANOLA KNOWS NO BORDERS'. The action comes two days after the New South Wales (NSW) Government officially announced that it would join Victoria in commercially growing GE canola.
(c)Greenpeace/Ascui

AN (UN)SOUND CALCULATION?

With close inspection we can see a number of major flaws in how the Regulator approves GE organisms. Like the science that underpins GE, the approval process takes a reductionist approach. This reductionist approach fragments reality - it selects a few points – human health and our environment - and focuses on only them. This means that the approval process does not take the whole picture into account or look at how pieces of the picture interact with each other.

This approach is not true to reality: we do not live in a vacuum, everything we do affects everything else in our world – genes, just like human beings and other plants and animals (and even whole ecosystems) interact with each other and form complex relationships, just like a spider spinning its web: everything is inter-connected.

GE also has economic and social impacts – but these considerations are necessarily excluded by the risk-based approval process: if people write to the Regulator and oppose the release of an engineered organism on economic or social grounds, their concern is not heard. Social and economic impacts are outside the terms the Regulator is allowed by law to consider: only 'objective' scientific knowledge is considered.

Image (right)
Genetically engineered
Ciba Gelgy corn.
(c)Greenpeace/Gilabert

THE MAJOR PROBLEM

The problem is that much of the evidence the Regulator considers is supplied by the industry who wants to release the plant or animal in the first place - which raises the potential for bias and throws the 'objective' nature of the evidence into doubt. Focusing only on 'objective scientific knowledge' also means that public concerns such as whether GE is acceptable to a given religion, are not considered by the Regulator.

Moreover, the approval processes deems a risk acceptable if the possible negative outcomes of a GE organism are similar to those negative outcomes caused by conventional varieties - in other words, conventional varieties are taken as a baseline to determine acceptability of GE crops, even if the conventional kinds cause environmental damage. As more engineered varieties are released, the baseline shifts further in support of GE. This means that where a specific crop like cotton, becomes dominated by engineered varieties, the likelihood increases for more and different varieties of engineered cotton being released.

This assumes the public believes that human health and environmental impacts from current agriculture are acceptable.

Over 95 per cent of Australia's cotton growers planted transgenic cotton in the 2007/08 season.
(Cotton Australia, 2008)
Bearden, 2007.

The problem is that much of the evidence the Regulator considers is supplied by the industry who wants to release the GE organism in the first place.

This assumption is highly unlikely – the current trend is that people are becoming more aware of the need to live sustainably and the importance of reducing our ecological footprint.

There is also a major trend embracing organic and biodynamic produce, which is driven by consumer concerns over safety and health, the wellbeing of our environment, sensory appeal and social factors (McCoy 2000; Haplin 2004). We are realising that polluted, degraded land from agricultural practices is not acceptable and that a healthy environment is fundamental to a healthy society.

A healthy environment is also necessary for the wellbeing of future generations, but the approval process does not consider their wellbeing at all. Any new technology such as GE should enhance our wellbeing and our welfare in a way that is equally fair to us, the present generations, and to future generations as well – this is known as intra and intergenerational equity. In the approval process no such equity exists: no consideration is given to the threat of genetic pollution, increased pesticide use, the loss of biodiversity, nor economic impacts.

This is unfair to future generations, who could inherit an even more degraded and genetically unstable environment from us.

A healthy environment grows healthy food: both are necessary for the wellbeing of current and future generations.
Rhonda Davies, NSW, 2008.

FOOD STANDARDS AUSTRALIA NEW ZEALAND (FSANZ)

One of the primary concerns about GE food is that it could negatively affect human health. Without labelling, people are not able to exercise their right to choose whether or not to eat GE food. Due to these factors, people argue in favour of comprehensive labelling for food containing GE ingredients.

As the law currently stands, the labelling regime for such foods is far from comprehensive. Generally, we do not even know what we are eating - out of twenty-two GE varieties currently approved by FSANZ for human consumption, only one is required to be labelled in all circumstances – the number of unlabelled ingredients increases if you also take food additives and processing aids into account, which are not required to be labelled at all.

These twenty-two GE foodstuffs, plus additives and processing aids, could appear in hundreds, if not thousands, of products. They are on our supermarket shelves and in our school canteens. However, food clearly labelled as containing GE ingredients is difficult to find. Among the rare cases of such food labelling are McCormick foods including Cake Mate, Salad Solutions and Bacon Flavoured Chips which are labelled as containing GE ingredients as are Stagg Vegetable Garden and Chilli Beef (Hormel) and Connoisseur Sandwiches.

Children are the most likely group of consumers of foods that potentially contain engineered ingredients, such as processed foods and sweets – like the coloured icing for gingerbread men.

FOOD STANDARDS

Children are also the most susceptible to health effects associated with engineered food, developing health problems such as increased allergies, nutritional problems, and antibiotic resistance (Smith, 2007). FSANZ does not even look at how the engineered foods affect developing bodies. It also relies largely on scientific evidence undertaken by the company producing the GE organism. Like applications to the Regulator, this raises the possibility of bias (Lembocke, 2003), especially when biotechnology companies withhold supply of engineered seeds to independent researchers (Dalton, 2002, Smith, 2007).

We will also find it difficult to avoid GE ingredients when we choose to 'eat out' because prepared food is not required to be labelled. Nor can we check our pet and stock food for engineered ingredients – or ensure that we only eat meat and other animal products from animals fed food free of GE ingredients because labelling is not required. The majority of stockfeed sold in the Nambucca Shire – including cattle, horse, goat, chicken and pig food – contains GE cotton ingredients. In fact, it is nearly impossible to find animal food that does not contain such ingredients – and none of this produce requires labelling.

If caused by accidental contamination, no labelling is required where the GE foodstuff is present at less than 1% of the final product (FSANZ Standard 1.5.2).

Cake Mate icing contains genetically modified cornsyrup, cornstarch, maltodextrim, vegetable oil and emulsifiers.
Lyn Orrego, NSW, 2008.

The majority of stockfeed sold in the Nambucca Shire – including cattle, horse, goat, chicken and pig food – contains GE cotton ingredients. In fact, it is nearly impossible to find animal food that does not contain such ingredients – and none of this produce requires labelling.

This means that despite religious issues, under current laws, the case of the unapproved release of transgenic pig meat in Adelaide in 1988 (Anderson, 1990; O'Neill, 1990) would have been legal if the amount present in the final food was lower than 1%.

Surprisingly, labelling of GE foods is only required if new DNA or protein is present in the final food, or if the GE offends people's values. But FSANZ leaves it up to the producer to test for the presence of new DNA or protein in the final food, which creates bias in their favour.

Similarly, companies are also responsible for deciding whether a belief is 'significant' enough that labelling should be applied on ethical, religious, or cultural grounds (Pers Comm, 2007). This criterion undermines our human right to make food choices based on our cultural, religious or spiritual beliefs and assumes producers are knowledgeable in these matters.

This factor, together with the small number of foodstuffs labelled as containing GE ingredients, makes a mockery of the FSANZ claim that "... the purpose of labelling is simply to provide information to consumers, allowing them to purchase or avoid GM foods depending on their own views and beliefs" (FSANZ, 2005). Without comprehensive labelling, such choice-making is impossible.

As the law currently stands, the labelling regime for such foods is far from comprehensive – generally, we don't even know what we are eating …

Out of twenty-two GE varieties currently approved by FSANZ for human consumption only one is required to be labelled in all circumstances.

Stagg – one of the few foods labeled as containing GE ingredients that are on our shelves. Without comprehensive labelling, there is no way of knowing if unlabelled foods contain GE ingredients.
Lyn Orrego, NSW, 2008.

Image (below)
Greenpeace activists, joined by professional crop circle makers from the UK, protest against contamination of Mexico's maize supply from genetically engineered maize. The activists create a 65-meter "crop circle" question mark in a maize field in Ayotzintepec, Oaxaca, a region that has been contaminated by genetically engineered maize. The question mark signifies the unknown nature of where genetic contamination can occur.
(c) Greenpeace/Gustavo Graf

The Regulator and our Food Standards Authority do not consider many important issues, such as:

- Social issues, positive or negative;
- Economic issues, including liability for contamination, impacts on local and international trade and patent royalties;
- Ethical, cultural, religious or spiritual issues;
- Political issues;
- Agricultural issues including: market viability, segregation, herbicide use, impacts on organic or other farmers not using gene technology;
- Labelling concerns;
- Intergenerational equity concerns.

In 1998 the NSW Department of Agriculture recognised that to make agriculture more sustainable, we must ultimately change the way we farm (DPI, 1998). Fortunately, there are other ways of growing food that do not involve polluting the environment or mixing the genes of plants and animals together.

Before people started using chemicals and synthetic fertilisers plants and animals were grown using methods that relied on the biological processes of nature.

Most people recognise these methods as organic agriculture.

THE ALTERNATIVE?

ORGANIC AGRICULTURE

Organic agriculture recognises that we must see ourselves as part of, rather than separate from nature (which is how we have seen ourselves over recent times). Organic agriculture is holistic - it recognises that everything is interconnected, that different species form relationships with other species in a way that benefits both species. The environmental principle of ESD recognises that seeing ourselves as part of this interconnected whole is necessary if we are to protect and maintain environmental diversity and integrity (EA, 2000). Indeed, adopting this mindset is considered "crucial to achieving a sustainable future" (McCluney, 1994).

There are already around 25 certified organic growers in the Nambucca Shire who produce a range of organic products including bananas, seasonal vegetables, mixed fruit, Russian garlic, mulch hay, beef cattle, tea tree melaleuca oil, herbs, macadamia nuts, pumpkin, watermelon, avocado, mango, tomato, lychees, and eggs. Organic beef constitutes 21% of the beef industry in the area. This equates to around 320 ha of certified organic and in-conversion land in the Nambucca Shire, which is the second highest area of land certified or in-conversion in the Mid North Coast of NSW (MNC, 2005).

Organic lemon tree.
Lyn Orrego, NSW, 2008.

Image(above)
Organic snow pea
Lyn Orrego, NSW, 2008.

ECOLOGICAL DIVERSITY

In Australia, relatively few scientific experiments have been undertaken to look at organic agriculture's environmental impacts and there are no studies comparing organic agriculture with GE crops. Evidence overseas, however, suggests that organic agriculture is generally more environmentally friendly than conventional agriculture, both locally and overall, because it enhances biodiversity, avoids the use of chemicals and associated pollution, and helps alleviate the impacts of climate change (Kasperczyk, 2006). Furthermore, because organic agriculture avoids the pitfalls of GE in agriculture such as pollution caused by synthetic chemicals, it is likely to be more environmentally sound than either conventional agriculture or GE in agriculture.

Organic agriculture promotes biodiversity - genetic, habitat, floral and faunal diversity are present to a greater degree on organic farms compared to conventional farms (Kasperczyk, 2006): some studies have found diversity to be six times higher (Hald, 1990). This should not be surprising – maintaining and enhancing environmental diversity is a primary goal of organic agriculture as its practices require the help of ecological services such as open pollination, natural pest control and high soil fertility. In contrast to GE and its ability to erode genetic resources, organic agriculture is also an effective way to conserve, restore and maintain agricultural biodiversity (Scialabba, 2002a, 2002b). This means that organic agriculture holds the promise of ensuring that future generations retain access to a wider range of varieties of fruit and vegetables.

Conventional farmers and those using GE organisms use synthetic pesticides and fertilizers. Organic agriculture's prohibition on chemical pesticides and fertilizers means that its practices avoid serious and irreversible pollution of air, ground and water including less nitrate leaching and less nutrient pollution of ground and surface waters than conventional methods (Peterson, 1999; Stolze, 2000). This prohibition is beneficial to both the farm itself, the wider environment and the health and wellbeing of both present and future generations. Avoiding water pollution caused from agricultural phosphorous leaching would be of considerable benefit in the Nambucca Shire – all seven surface water sites in the Shire tested for phosphorus leaching have exceeded levels of pollution of water quality guidelines at some time in the past four years (NSC, 2007).

Recent studies also suggest increasing land used for organic agriculture will help reduce climate change – scientists at the US Rodale Institute have proved that each hectare of organic farmland can take about 7000kg of carbon dioxide from the air each year (Farm Online, 2008). This means that in the USA, if 10, 000 conventional farms of 320 ha each converted to organic production, the carbon stored in the soil would be equivalent to taking 1, 174, 400 cars off the road (Rodale Institute, 2003). If all US farmland was converted to organic, it would equate to nearly 88% of all cars in the US – or a third of all cars in the world – being taken off the road (Farm Online, 2008).

With such environmental credentials, it is hard to understand how people could not embrace the expansion of the organic industry – especially when public health and the economy are taken into account.

Green Tree Frog – Frogs, as keystone species, are susceptible to agricultural chemicals.
Tony Allison, NSW, 2008.

Clean water: beneficial for farms, the environment and health of present and future generations.
Tony Allison, NSW, 2008.

If all US farmland was converted to organic, it would equate to nearly 88% of all cars in the US – or a third of all cars in the world – being taken off the road.

Organic agriculture's avoidance of conventional pesticides benefits farmers, workers and consumers: around the world, 20, 000 people per year die from pesticide poisoning and many more become ill (FAO, 2007). Consumers and their children benefit from lower pesticide residues: A study on pesticide residue in children fed organic foods found their levels of organophosphorus pesticide residues to be considerably lower than those fed conventionally produced foods (Lu, 2008). Overall, pesticides are up to four times lower in organic foods compared to conventional foods (FAO, 2007).

Organic food results in fewer incidents of allergies and is nutritionally superior when compared to conventionally produced foods (FAO, 2007). For example, organic strawberries have been found to slow cancer cell growth more effectively than conventional strawberries (ISIS, 2008). A higher level of vitamin E, omega 3 essential fatty acids and antioxidants is present in organic milk than that found in conventional milk (Butler, 2008). Organic food has also been found to have higher vitamin C content, fewer nitrates, higher zinc/phytate ratio, and higher levels of amino acids (FAO, 2007).

Organic food results in fewer incidents of allergies and is nutritionally superior when compared to conventionally produced foods (FAO, 2007).

HEALTHY SOCIETY

It is little wonder that the Food and Agriculture Organization of the United Nations has recognised the widespread nutritional benefits of organic agriculture: "organic agriculture increases the availability of nutritious food (especially those rich in micronutrients), strengthens dietary diversity and healthy eating habits, prevents unbalanced diets that may lead to malnutrition, obesity and degenerative diseases, promotes gardens both at home and schools and encourages customs and traditions on matters related to food" (FAO, 2007).

As organic agriculture tends to avoid the use of antibiotics on animals, pathogens found in organic animals respond well to antibiotics (Brandt, 2007). There is also less risk of pathogens spreading from animal to human than on conventional farms (ibid). These features of organic agriculture are especially important in light of the development of antibiotic resistant pathogens in hospitals.

The home vegetable patch benefits health and saves money.
Compost bins, Lyn Orrego, NSW, 2008.

Consumers are more conscious of their health and the wellbeing of the environment than ever before and are turning to organic products as an expression of their preferences: organic produce is the fastest growing food sector in Australia and around the world. In Australia alone, consumption of organic food is increasing at between 25 – 40% per annum and production at around 10 – 30% per annum (RIRDC, 2006). This equals both local opportunity and great export potential for Australia, especially in areas such as organic milk, beef and many horticultural products, which are in short supply (McCoy, 2000).

High demand and shortfall in supply mean that organic farmers tend to receive a higher price for their goods than their conventional counterparts. From 1998 to 2000, Australian organic grain farmers received a 60% price premium for their product (RIRDC, 2006). However, for some types of organic produce, yields can be lower than those from conventional farms: overseas studies show a decline in corn yield when the farm first converted to organic production, but following that initial period, yields were comparable. In drought conditions, the organic crops fared better than their conventional counterparts (Peterson, 1999).

Organic farming relies on biological control, crop rotation, traps, barriers, light, sound and livestock to control pests and disease – there is only limited use of naturally sourced pesticides like rotenone, copper and pyrethroids. Consequently, organic farmers spend less than conventional farmers on pesticides, and use organic fertilizers in place of expensive chemical fertilizers. Moreover, as organic standards prohibit the use of GE seed, farmers avoid the high costs of purchasing patented seed and the licence to use such seed.

Off-farm environmental degradation results in a loss of agricultural production – but the polluter does not pay. Rather, the cost is shifted to the Australian taxpayers at around $1.2 billion per annum.

ECONOMIC OPPORTUNITY

We need to look beyond the farm gate to work out if a farming practice is economically viable for us as a society. Conventional farming is responsible for off-farm environmental degradation: saline, sodic, acidic soils and algae blooms are caused by conventional agricultural pesticide and fertilizer runoff.

This environmental degradation results in a loss of agricultural production – but the polluter does not pay. Rather, the cost is shifted to the Australian taxpayers at around $1.2 billion per annum (PMSEIC, 2002). The cost to taxpayers and those not responsible for the pollution is set to increase with the introduction of GE organisms – as discussed above, there is no statutory liability regime governing GE organisms: liability is distributed throughout the supply chain.

In contrast, there is general scientific consensus that organic agriculture avoids down-stream pollution from agricultural chemicals and thus such environmental and economic costs (Stolze, 2000; Condon, 2000). Taken together, these features of organic agriculture meet many of the economic principles of ESD: with organic agriculture, we can create a diverse, viable economy that increases our international competitiveness while simultaneously protecting our environment.

Organic agriculture produces a healthy and sustainable bounty. *http://www.flickr.com/photos/valjk/63469442/.*

WHAT WE CAN DO

GENETIC ENGINEERING: NOT IN OUR BACKYARD

The release of GE organisms comes at the expense of the stability of our environment, the welfare of our people, and the viability of our economy. The current regulatory regime fails to look at whether GE is ecologically sustainable, and the GTR's risk-based approach is flawed. If we are to ensure our wellbeing, both now and into the future, we need to embrace an alternative and much more sustainable way of farming.

The Nambucca Shire Council can, and should, promote sustainable alternatives such as organic agriculture. After all, GE and organic agriculture cannot co-exist and the organic industry is already well established in the Shire. However, to protect our existing industry and to encourage the growth of the organic industry requires Council to take action. Council needs to declare the Nambucca Shire to be a Genetic Engineering Free Zone, and to make the necessary amendments to its Local Environment Plan. Anything short of this recommendation is unacceptable.

WHAT WE CAN DO

There are many things we can do, both as individuals and collectively to help stop the spread of GE plants, both in our environment and in our food.

- **Learn about GE.** Talk to your friends and family about it – read books and articles in the newspaper, listen to the news, see flims on the issue, and search the internet.
- **Read the labels on the food you buy.** Contact manufacturers and ask if their products are free of GE ingredients – from paddock to plate. Phone them and let them know you won't buy their food if it is not GE free – follow up with a letter seeking answers to your questions. Change food companies if they don't reply or won't guarantee their produce to be free of GE organisms!
- **Ask local restaurants and food outlets** to source ingredients that are free from GE organisms.
- **Ask local stockfeed suppliers** to only sell feed free of GE organisms.
- **Find out if your local school canteen or cafeteria sells food that contains GE ingredients.** Meet with your local Parents and Teachers Association and demand that food sold or produced at school is free of GE ingredients – don't forget the power of the media on this one!
- **Find out if any Council-sponsored "Meals on Wheels"** or pre-school provides food that could contain GE ingredients. Write to council demanding that these services provide food that is safe to eat and free of GE ingredients.
- **Write a letter to council** and/or start a petition demanding that your Local Government Area be declared a GE Free Zone.
- **Write to the Federal Government** and remind them that Labor's 2007 election Plan for Primary Industries noted that "[Labor] believe that genetically modified (i.e. GE) crops should not be approved for commercial release unless they are safe to health and the environment, and beneficial to the economy …[that] safe and beneficial standards must be established beyond reasonable doubt and standards must be met to the satisfaction of the government, the scientific community, the consumer community and the farming community" (O'Brien, 2007). Remind them that this has not occurred.
- **Write to FSANZ** and request that Standard 1.5.2 be reviewed so that all GE ingredients in food are labelled, regardless of amount or presence of novel DNA or protein. (Standard 1.5.2 governs the presence of GE organisms in food);
- Bookmark http://www.ogtr.gov.au/ and **keep up to date about proposed releases of GE organisms** - make submissions to the Regulator opposing their release (make sure your opposition argues a threat to human health or our environment, to ensure it will be considered).
- Bookmark http://www.foodstandards.gov.au/ **and make a submission on any new GE foods** seeking to enter our food chain.
- **Support locally grown food** – buy from local food markets and outlets and talk to farmers about the importance of only growing GE free food. Encourage local farmers to go organic.
- **Support seed saving groups** – plant non-hybrid, open-pollinated heritage seeds.
- **Support groups who oppose GE**.
- **Buy organic or grow your own**.

Lyn Orrego, NSW, 2006.

Tony Allison, NSW, 2008.

Tony Allison, NSW, 2008.

Lyn Orrego, NSW, 2005.

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